Specialized Oil Publications of
THE GULF PUBLISHING COMPANY
Box 2608, Houston (1), Texas

The OIL WEEKLY and The COMPOSITE CATALOG
for the drilling-producing-pipe line industry

PETROLEUM REFINER and The REFINERY CATALOG
for the refining-natural gasoline industry

EDITORIAL STAFF

WARREN L. BAKER, *Editor*

SILAS B. RAGSDALE, *Managing Editor*
L. J. LOGAN, *Associate Editor*
ELTON STERRETT, *Engineering Editor*

DISTRICT EDITORS

GEORGE O. IVES
HENRY OZANNE
250 Park Ave.
New York 17, N. Y.

ANTHONY GIBBON
WILLIAM P. STERNE
Hunt Bldg.
Tulsa 3, Okla.

R. W. BYRAM
Drawer M
Capitol Station
Austin 21, Texas

E. N. TIRATSOO
62 Redcliffe Square,
SW 10
London

BERTRAM F. LINZ
Albee Bldg.
Washington 5, D. C.

GILBERT M. WILSON
W. W. Wilson Bldg.
Huntington Park, Calif.

H. H. KING
W. T. Waggoner Bldg.
Fort Worth 2, Texas

JAMES S. CRITZ
WELDON B. HILL
AL REESE
J. E. KASTROP
CECIL SMITH
3301 Buffalo Drive
Houston 6, Texas

ADVERTISING STAFF

TOM W. NELSON, *Advertising Manager*

DICK SWINSKY
FRANK VICKREY
NELSON BIGELOW
250 Park Ave.
New York 17, N. Y.

J. F. CARTER, JR.
Hunt Bldg.
Tulsa 3, Okla.

J. W. CURTS
W. W. Wilson Bldg.
Huntington Park, Calif.

ROGER MOTHERAL
1010 Euclid Ave.
Cleveland 15, Ohio

H. G. FITZPATRICK
332 S. Michigan Ave.
Chicago 4, Ill.

CHARLES WYATT
BILL ATCHESON
3301 Buffalo Drive
Houston 6, Texas

CIRCULATION DEPARTMENT

J. HOWARD DONAHUE, *Manager*

Published every Monday. Single copies 25 cents (except special issues). Subscription price: domestic and foreign, $2 a year; 2 years, $3; 3 years, $4. Advertising rates on application.
Copyright 1947 by The Gulf Publishing Company.

The OIL WEEKLY

ENGINEERING NEWS STATISTICS

R. L. DUDLEY, President, Publisher A. L. BURNS, General Manager

Contents

APRIL 7, 1947

VOLUME 125, No. 6

Technical and Feature Articles

WATER-FLOOD TESTS ON LONG CORES 36
By R. A. Morse and S. T. Yuster

PACIFIC GAS & ELECTRIC COMPANY'S PIPE LINE SYSTEM *(ninth of a series)* 41

UNCONFORMITIES TO PLAY MAJOR ROLE IN ARKANSAS-NORTH LOUISIANA DISCOVERIES *(second of three parts)* 42
By Michel T. Halbouty and George C. Hardin, Jr.

AN EVALUATION OF PRESENT-DAY GEOPHYSICAL EXPLORATION FOR OIL *(last of four parts)* 45
By Sylvain J. Pirson

ACCIDENT PREVENTION IN GEOPHYSICAL EXPLORATION 53
By John F. Imle

UNSALVAGED CASING MENACED IN ABANDONED STRIPPER WELLS 58
By F. R. Cozzens

NEW DRILLING CONTRACT REPORT FORM 61
By Anthony Gibbon

CONVENIENT MANIFOLD SUPPLIES EIGHT AUXILIARY MUD LINES 62
By Gilbert M. Wilson

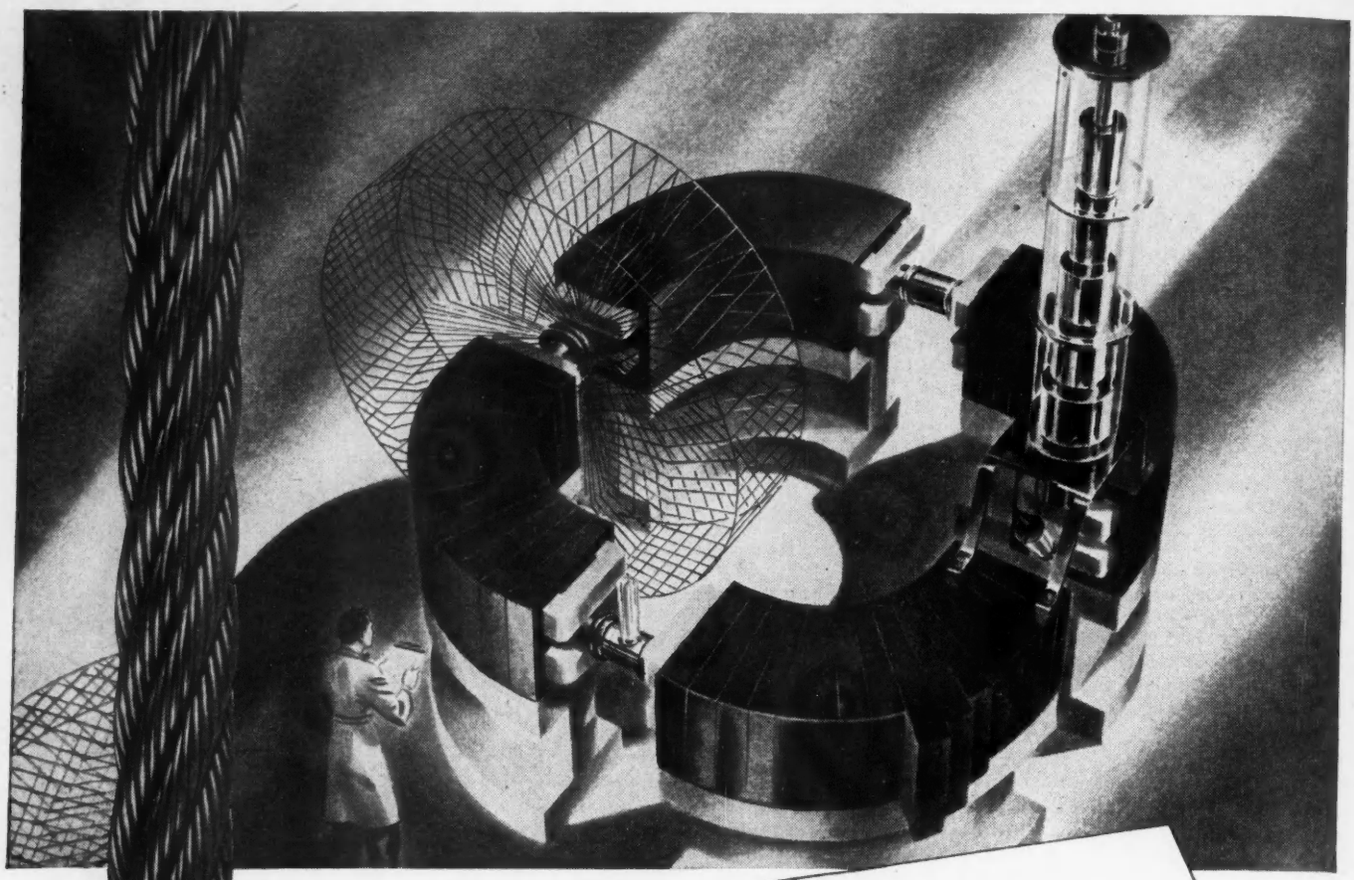
DRILLING HINTS 64

Monthly International Feature Section

INSERT 68-69

News and Departments

LOOKING AHEAD 4
THE OUTLOOK 27
THE CHANGING PANORAMA 29
THE WEEK'S NEWS 31
CRUDE PRODUCTION 33
PIPE LINE NEWS 35
NEW EQUIPMENT, LITERATURE 69
MARKET TRENDS 72
FIELD OPERATIONS 75
EXPLORATORY FAILURES 91
SQUEAKS FROM THE BULL WHEEL 93
MEN IN THE INDUSTRY NEWS 94
BOOK REVIEW 97
MANUFACTURERS' NOTES 98
ADVERTISERS' INDEX 100



Precisionbilt LIKE A SYNCHROTRON*...

J&L WIRE ROPE

PERMASET PREFORMED

Like a synchrotron,* J&L Precisionbilt Wire Rope is made to do its work and do it well. And, just as men of science look to the future J&L men are planning and working to produce an even better wire rope for you—wire rope that will give you increased service and reduce your maintenance costs. Specify J&L Precisionbilt Wire Rope for your equipment.

**A 300 million-volt synchrotron that will produce energy similar to that of cosmic ray particles is being constructed by scientists. It will go a step beyond atom-smashing to study sub-nuclear particles.*

J&L STEEL

JONES & LAUGHLIN STEEL CORPORATION

GILMORE WIRE ROPE DIVISION

PITTSBURGH 30, PENNSYLVANIA

J&L *Precisionbilt* PERMASET PRE-FORMED WIRE ROPE

Relation of Price To Supply of Oil

FOLLOWING the price increases this year, it is not clear what the future holds regarding prices of crude oil and petroleum products. Increases which already have been announced were made virtually inevitable by sharply higher costs. The present prices of oils actually are quite moderate as compared with commodity prices in general. Consumer prices in general are now more than 50 percent above prewar, with such important items as food, clothing, and house-furnishings almost double prewar. But gasoline, excluding taxes, is up only about 20 percent, representing the consumer's best bargain of today except rents, which are arbitrarily held down without regard to costs. At the middle of March this year, the average gasoline price, excluding taxes, at the service stations was approximately 16.1 cents per gallon. At the end of World War I the average price of gasoline, without tax, was 29.7 cents a gallon.

In view of the moderation in oil pricing heretofore, and considering various controlling factors, it is not certain that oil prices are as high now as they will have to go to bring forth all the oil supply needed. There are still some forces that tend to push prices higher, including the continued high costs of materials and labor, the increased urgency of new facilities that will be abnormally expensive, the increased need for ultra-deep drilling, off-shore development, and other efforts to increase reserves, and the necessity of introducing radically new processes such as the synthesis of natural gas into gasoline. All these things are necessary to provide oil supply equal to prospective demand, and "right" prices are the prices that will bring these supply-inducing forces into full play. If present prices will do these things, competing companies will not approve any further increases. But if supply should lag over an extended period, further increases would have to be considered. So far, supply is equal to demand, and work is proceeding toward expanding potential supply. It is conceivable but not certain that oil prices are as high as they will have to go.

For the long term, there is of course a possibility that prices ultimately can be brought down, through technological means as well as the workings of the national economy. And in the light of the history of oil prices, under a free economy, the public can rest assured that the oil industry will pass on to consumers any economies it achieves in its operations. Oil could never have attained its present tremendous use in the United States without having been made available at relatively low cost.

Oil Prices and Political Thunder

THE real need for a public relations program, such as that which the industry has initiated has been emphasized by the criticism which followed increases in prices of crude oil and refined products. This criticism has come principally from politicians, rather than the public, but the industry needs voices to answer the politicians and keep the records straight.

Although based simply on the greatly increased costs of the industry, which the public ought to understand without a great deal of explanation the latest oil price increases nevertheless were used as thunder by the politicians, and perhaps the industry should have answered possible criticism fully in advance or at the time of the price changes.

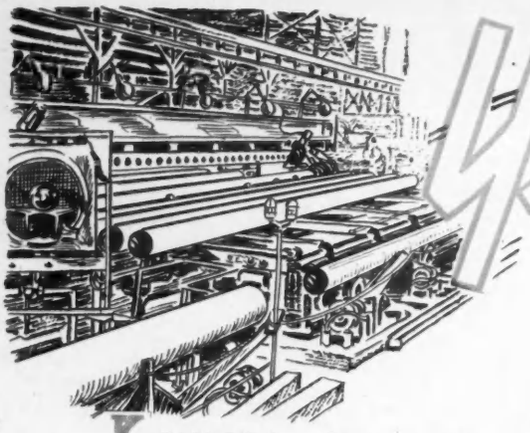
Following the political cries in California, oil companies defended the price revisions as much more moderate than increases of commodities in general and as unavoidable because of higher costs. It was pointed out that regular grade gasoline had been increased altogether only 17 percent from prewar in rising an aggregate of 2.3 cents a gallon from 13.5 cents prewar, ex tax, in Los Angeles. In the rest of the country increases have been similarly moderate. Much of this increase has been in compensation for higher cost of crude oil, which has risen altogether approximately 70 cents a barrel above prewar, equivalent to 1.66 cents a gallon, in reflection of sharply higher expense in finding and producing oil. Other industry costs also have increased, including those involved in transportation and refining.

It is doubtful if the public seriously questions the fairness and necessity of increases which have been made in prices of oils, or if it would be willing to run the risk of a shortage of oil by insisting on prices too low.

But if politicians are allowed to misrepresent the truth about oil industry operations and problems, the public may be misled into erroneous conceptions, to the detriment of both itself and the industry. In the present situation the public needs to know that the prevailing prices of crude oil are necessary to stimulate development of new reserves, which in turn are essential for assuring continued adequate supply.

The better the public is informed about the industry and the better its understanding of the industry's problems and operations, the less likely is it to be fooled by political thunder.

Toward promoting this better understanding by the public, every oil company and every individual within the industry is obligated to take a part in gaining and holding the confidence of the public. And in this abnormal time when the public is critically price-conscious, oil companies which take the role of price leader will do well to give full public explanation of any price revisions that may be initiated.



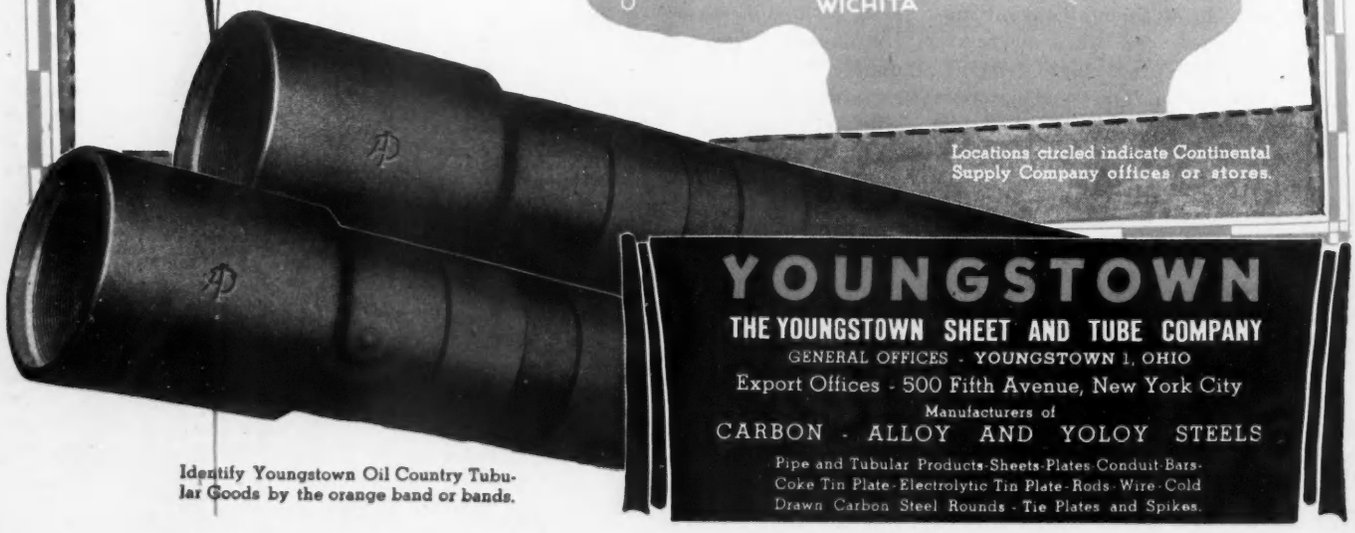
Youngstown to KANSAS

KANSAS has been an important oil and gas producing state for nearly half a century. In fact, it was the year Youngstown rolled its first oil country tubular goods--1903--that the Sunflower State first approached a million barrels of crude production.

In its all-time output of oil, Kansas ranks fifth among the states--fifth also in 1946 production. Proven reserves have fallen somewhat during recent years, but more wells are forecast for the future and footage to be drilled is on the increase. Kansas is not a deep well state, but the drilling trend is to lower horizons, with a new depth record of nearly 8,000 feet in Meade County in 1945.

For over 40 years Kansas operators have found that Youngstown Oil Country Tubular Goods have the sturdiness and built in quality to meet all the exacting demands of Mid-Continent drilling and production. Here as in other areas, oil men are able to depend on Youngstown drill pipe, casing, tubing and line pipe for good performance, whether service conditions are corrosive or normal. Through long experience they have come to recognize the orange bands as the mark of quality and dependability.

Locations circled indicate Continental Supply Company offices or stores.



Identify Youngstown Oil Country Tubular Goods by the orange band or bands.

YOUNGSTOWN

THE YOUNGSTOWN SHEET AND TUBE COMPANY

GENERAL OFFICES - YOUNGSTOWN 1, OHIO

Export Offices - 500 Fifth Avenue, New York City

Manufacturers of

CARBON - ALLOY AND YOLOY STEELS

Pipe and Tubular Products-Sheets-Plates-Conduit-Bars-Coke Tin Plate-Electrolytic Tin Plate-Rods-Wire-Cold Drawn Carbon Steel Rounds - Tie Plates and Spikes.

THE WEEK'S NEWS

THE State Department has politely but firmly rejected the French protest against the participation of two additional companies in Arabian American Oil Company as a violation of the Red Line agreement, holding that the matter is a purely private arrangement between private parties in which the U. S. Government cannot intervene. Page 33.

Co-Op Tax Probe—Representative Walter C. Ploeser of Missouri, who last year attacked Congressman Wright Patman's fence-straddling report on the tax advantages of co-operatives, has been named chairman of the House Small Business Committee and is expected eventually to undertake a thorough airing of the cooperative set-up. Page 33.

Anglo-American Oil Pact—Renewed efforts are to be made for consideration of the Anglo-American petroleum agreement by the Senate Foreign Relations Committee this month, lest further delay makes ratification impossible during the current session of Congress. Page 33.

Ball on Oil Compact—Secretary J. A. Krug has named OGD Director Max Ball as the Interior Department's representative on the Interstate Oil Compact. Story below.

Oil-Gas Questions—Undersecretary of the Interior Chapman passes on to the industry the matter of answering complications raised in recent Denver speech. Story below.

Crude Rubber Supplies—The Indonesian revolt has cut heavily into crude rubber supplies from the Netherlands Indies and unless conditions improve much less rubber than anticipated will be available in that area this year.

East Venezuela Line—Socony-Vacuum announces it has the pipe purchased for 78-mile line to serve the Greater Oficiana area, Western Venezuela. Page 35.

Middle East Oil Inquiry—Former Senator Burton K. Wheeler of Montana has been employed by the Senate War Investigating Committee to make a quick probe of the Navy's purchases of Saudi Arabian oil, preliminary to hearings at which a lot of old stories will be retold, including that of Ickes' proposal to "buy into" Arabian American by building a pipe line. Page 33.

Big Inch Application—Texas Eastern Transmission Corporation has filed application with the Federal Power Commission for authority to acquire and operate the Big Inch lines, which it is due to take over by next November 25. Page 32.

End of Stripper Subsidy—The last activities under the government's program for subsidizing stripper-well operators during the war were ended April 1, termination date fixed in legislation adopted last year for extension of OPA. Page 72.

Ball Named to Represent Interior on Oil Compact

Max W. Ball, director of the OGD has been designated by Secretary J. A. Krug to be Interior Department representative to the Interstate Oil Compact Commission, on which, under the bylaws of the commission, he will participate in all proceedings but will have no vote.

Ball's first official meeting with the commission will be next month, when a joint department-commission conference will discuss encouraging of secondary-recovery operations.

Originally planned to be held April 28, the joint meeting had to be postponed when Chairman Hiram Dow of the Interstate Oil Compact Commission expressed doubt of his ability to attend because of other engagements. It is expected now that the conference will be held May 15.

Orton, Ottignon Promoted By The Texas Company

Greer W. Orton has been appointed general manager of the foreign operations department of The Texas Company, and A. M. Ottignon has been named to succeed Orton as assistant to the president.

Orton, a native Texan, was manager of the purchasing department for the company from 1943 to January of 1946 at which time he had been made assistant to the president. He has been with the company since 1928.

Ottignon, 32 years with the company, has been supervisor of supplies and distribution for the refining department, becoming assistant to the general manager in 1938, and supervisor of supplies and distribution in 1942.

Chapman Would Provoke Thinking On Complicated Oil-Gas Picture

Confessing inability to answer the questions he had raised regarding our future oil supplies in an address before the Colorado Society of Engineers January 31, Undersecretary of the Interior Oscar L. Chapman said last week that his speech was provocative—designed to challenge the engineering profession "to use more of their talents, collectively and individually, in the solution of broad social problems and especially those concerning the use of natural resources." (See March 3 THE OIL WEEKLY, page 21.)

Questions Use of Gas

Chapman's suggestion in his address that, with a diminishing supply of oil, it might develop that natural gas could be used more profitably to produce gasoline than to produce steam under boilers, raised questions whether he was suggesting a ban in the use of oil and gas in eastern areas with accessible coal supplies, who would determine what a low-grade use is, whether the prohibition of the use of gas for steam-generation would apply in the producing areas or at some predetermined distance from their borders, and how royalty owners could be compensated for keeping their oil and gas in the ground until they were required for superior uses. His statement to THE OIL WEEKLY was in response to questions along these lines.

The Undersecretary pointed out that in his address he was pointing out the "complications" of the oil-gas picture, that in addition to the possibility that more valuable uses could be found for gas than steam generation, there were the questions of synthetic fuels, the opposition of the gas states to export of gas, and the implications in future development of atomic energy, and this was followed by a direct question whether the engineering profession could produce a workable solution of the problems so raised or would simply say that the whole nation's future in the fields of energy and heat cost could be left entirely to the price mechanism, "the still primitive tool of another profession, the economists."

"In reference to oil and gas," he explained, "I pointed out some of the problems which already are with us, and others which are certain to be pressing in the future. I asked that the engineering profession aid us in formulating answers to these problems.

"I wish that I were able to answer specifically some of the questions I propounded in that speech.

"We do not have an illimitable supply of either oil or gas in this country; the world supply, although much of it remains undiscovered, obviously also has its limits. It would be foolhardy of us to waste such precious resources, and low-grade use is a major type of wastefulness. And this applies to metals and other minerals as well as to oil and gas. The price mechanism generally determines the uses to which our resources are put but there is a very real question as to whether it is to the best interest of our country to depend solely on the workings of such a mechanism to obtain the best use of our resources."

National Council Names Jet Engines Fuel Group

A subcommittee on jet engine fuels specifications has been set up by the National Petroleum Council's committee on availability of fuels for military aircraft, and will participate in a proposed jet engine fuels conference between United States and British officials.

Council Chairman Walter S. Hallanan appointed W. M. Holaday, Socony-Vacuum Oil Company, New York, as chairman of the sub-committe, and D. P. Barnard, Standard Oil Company (Indiana), Chicago; J. B. Hill, Sun Oil Company, Marcus Hook, Pa., and S. D. Heron, Detroit, as members.

Companies Keep LPG Cars

The Office of Defense Transportation has allocated among eleven companies 423 liquefied petroleum gas tank cars declared surplus by the War Department.

The cars, which have been in the service of commercial companies for some time, were to have been sold as surplus, but due to pending litigation title will be retained by the government while the validity of the sale is being contested.

New Mississippi Map

A new map showing the outcrop pattern of the rock formations near the Jackson gas field in west-central Mississippi has been issued by the U. S. Geological Survey as Preliminary Map 65 of the Oil and Gas Investigations series, and is available from the Washington office at 50 cents a copy.

The map includes the Jackson anticline and the adjacent country for 15 miles to the east, an area of more than 650 square miles in Hinds, Madison and Rankin counties.

Deepest Well Trouble

Superior Oil Company of California's Weller 51-11 NW NW NE 11-8n-12w, in Caddo County, Oklahoma, deepest test in the world, still has drill pipe stuck 25 feet off bottom of the hole.

Total depth of the test is 17,236 feet. Previous attempts to sever pipe 300 feet off bottom with an inner cutter were unsuccessful and new efforts are being carried out to cut off the pipe so that tools either can be fished out or a whipstock can be set to bypass pipe.

Gas Anti-Waste Order Held Up by Texas Court

A temporary injunction against enforcement of the Texas Railroad Commission's anti-gas waste order for the Seeligson Field, Jim Wells and Kleberg counties, was granted last week by the 126th District Court in Austin. The state gave notice of appeal.

Outcome of the Seeligson case may determine the commission's procedure in 15 other major fields, where operators have been notified to show cause why they should not be shut down for excessive production of casinghead gas.

Gas Order Extended

Texas Railroad Commission emergency orders under which Lone Star Gas Company was permitted to produce during January, February, and March 60 million cubic feet of gas daily in excess of allowables from its connections in the Carthage field, Panola County, were extended last week until May 1. The gas goes to the Big and Little Big Inch lines.

Production from these wells is to be curtailed beginning May 1 until the overproduction is made up.

Last of Formalities in Big Inch Deal Initiated; TET Asking Quick Decision

Texas Eastern Transmission Corporation has initiated the last of the formalities standing in the way of purchase of the Big Inch pipe lines from the Government, applying to the Federal Power Commission for authority to acquire and operate the system.

TET asks authority to construct 66 miles of lateral lines to connect with gas distributing systems in the Philadelphia and New Jersey areas and 24 compressor stations with an aggregate of 122,000 installed horsepower in addition to the three stations of 18,000 horsepower to be built under its temporary certificate. The cost of the new facilities is estimated at $38,980,000, bringing the total investment in the system to $182,107,000 and giving it a capacity of approximately 425,000 Mcf daily.

New construction would begin within 90 days after certificate is granted and would be completed in about a year. Quick action is sought since the company's letter of intent from WAA calls for completion of the sale by November 25, next.

TET now is negotiating with various producers for gas and with the United Gas Pipe Line Company, which has indicated a willingness to enter into a 20-year contract for a substantial portion of Big Inch requirements. It is proposed to purchase flare gas up to at least 25 percent of the throughput capacity of the lines on the same price basis as for gas from regular wells. The gas is to be sold to distributing companies in the Philadelphia - New Jersey area, but the company said it may later seek authority to extend its operations to the Baltimore, New York and New England areas. Any interruptible sales necessary for load-balancing purposes would be made to oil refineries on the Eastern Seaboard which uses oil as fuel and are already connected with the Big Inch lines.

Says Department to Press "Mother Hubbard" Action

The Justice Department will press the API anti-trust suit to decision, Attorney General Clark has told Senator Dworshak of Idaho. Some had regarded recent moves by the Justice Department as suggesting it would abandon the "Mother Hubbard" suit in favor of a series of individual actions.

Clark said investigations are "proceeding as rapidly as possible" to obtain additional information necessary to bring the suit to trial, adding, however, that progress will be slow because of the large number of defendants and the broad scope of the suit.

The Attorney General's remarks were made in a letter written in reply to a request by Senator Dworshak that the Justice Department probe service station gasoline prices in Idaho on the grounds that they were higher than prices in surrounding states.

Oil Advertising Program Suggested to Start Soon

The oil industry's Public Relations Operating Committee, meeting last week in San Francisco, decided to recommend an industry advertising program to be started during the summer. The committee's recommendation will be made to the API Public Relations Committee in Washington, April 21.

District committee organization is several weeks ahead of schedule. At least eight of these committees will be operating within the next month.

Radio Communications System for Rogers Lacy

Rogers Lacy, Inc., has been granted construction permit by the Federal Communications Commission for developing and testing a Class 2 experimental radio communication system. The firm will have a 160-watt station at Longview, Texas, and ten 100-watt mobile units in vehicles at the scene of drilling and oil production operations. The system will operate on 31.98 frequency.

Puryear Named

E. E. Puryear, assistant to the chairman of the board of The Texas Company, has been named as petroleum member of an industrial mobilization committee set up by the Navy Industrial Association.

The committee consists of representatives of 18 major industrial classifications, and will assist in coordinating industry's contribution toward development of an industrial mobilization plan.

Wade to Lecture

Dr. F. Alton Wade, associate professor of geology at Miami University, Oxford, Ohio, and member of two antarctic expeditions, will lecture to the Houston Geological Society Thursday on "Antarctica, Past, Present and Future" at 8 p. m. April 10 at San Jacinto High School.

Cooperative Tax Investigation

A real congressional investigation of the tax and other advantages of cooperative associations appeared probable, although it may not come before next year, as Representative Walter C. Ploeser of Missouri became chairman of the House Small Business Committee.

Ploeser replaces Wright Patman of Texas, who last year issued a "yes and no" report on co-op tax advantages to which Ploeser put up such opposition that a final committee report never was issued.

Ploeser has indicated that he wants to go thoroughly into the question of cooperative competition with conventional business. However, at the present time, the committee staff is studying protests of small businessmen against their inability to purchase badly-needed materials from WAA, and several other matters, and it is questionable whether the co-op investigation can start this year.

U. S. Says Middle East Deal A Private Affair

The State Department last week prepared a lengthy reply to the French note protesting the alleged breaking of the so-called Red Line Agreement by the pending deal whereby Standard Oil Company (New Jersey) and Socony-Vacuum Oil Company would buy into Arabian American Oil Company.

The note told the French government rather flatly that it was not a government matter so far as the United States is concerned, although the government had been fully informed regarding the proceedings. Since the government has no ownership or interest in the Middle East oil properties, in contrast with the interests held by the English and French governments, it is not in a position to intervene, the note points out.

State Department Pushing For Oil Pact Discussion

Consideration of the Anglo-American oil agreement before the end of the month is sought by the State Department, where officials are anxious to have the treaty disposed of by Congress this session.

The Senate Foreign Relations Committee is scheduled, after the Greek-Turkey aid problem is disposed of, to take up four peace treaties with former Axis satellites.

Department officials contend that the oil agreement should be taken up as soon as the treaties are sent on their way to Senate ratification and that, if consideration of the treaties tends to be protracted, that they should be put aside in favor of the petroleum pact.

The department fears that if the agreement is not taken up by the committee within the next few weeks the Senate will not get it in time for ratification this session.

Grants That Oil Companies Due Diplomatic Protection

American oil companies operating abroad expect diplomatic protection and "probably ought to have it," Senator O'Mahoney of Wyoming, last week told a Senate judiciary sub-committee considering anti-monopoly legislation.

Discussion of foreign oil operations cropped out during Senator O'Mahoney's presentation of a four-point program to halt monopolistic mergers which he said threatened to wipe out the nation's competitive, free enterprise system.

The program would require corporations operating outside the United States to keep the government informed of its foreign contracts. Other points include tax reforms, creation of a National Bureau of Standards which would set Standards for both business and labor, and enactment of pending legislation to end escape clauses in the Clayton Act by giving the Federal Trade Commission authority to prevent corporate mergers by acquisitions of physical assets. Under the present law, FTC can prevent mergers by capital stock purchases.

U. S. Crude Oil Production

(Estimates compiled by THE OIL WEEKLY. All figures indicate daily averages in barrels.)

STATE OR DISTRICT	PRODUCTION IN WEEK ENDED April 5	March 29
Alabama	1,000	950
Arkansas	74,000	74,500
California	907,100	905,800
Colorado	38,000	37,000
Florida	600	650
Illinois	184,110	190,900
Indiana	18,000	18,000
Kansas	276,450	281,150
Kentucky	27,500	27,000
Louisiana	407,610	407,450
North Louisiana	95,000	96,000
South Louisiana	312,610	311,450
Michigan	43,500	41,500
Mississippi	88,000	87,750
Missouri	100	100
Montana	22,100	22,500
Nebraska	650	650
New Mexico	103,650	104,400
New York	12,900	13,200
Ohio	8,800	9,100
Oklahoma	379,250	370,400
Pennsylvania	34,100	34,800
Tennessee	25	25
Texas	2,150,550	2,129,750
Texas R. R. Comm. Districts:		
Dist. 1 South Central	20,665	20,550
Dist. 2. Middle Gulf Coast	157,960	157,900
Dist. 3. Upper Gulf Coast	483,440	487,300
Dist. 4. Lower Gulf-S.W.	241,970	242,000
Dist. 5. East Central	38,150	38,300
Dist. 6. East Texas Field	325,570	313,000
Dist. 6. Rest of Northeast	111,285	111,000
Dist. 7-B. North Central	36,770	36,425
Dist. 7-C. West Central	35,700	34,900
Dist. 8. West	480,710	473,725
Dist. 9. North	133,540	130,000
Dist. 10. Panhandle	84,790	84,650
West Virginia	7,000	7,500
Wyoming	110,750	111,000
Total United States	4,895,745	4,876,075

Total stocks, foreign and domestic, March 29 as reported by the Bureau of Mines were 227,529,000.

Rail Transportation Group Drafting Report for NPC

Members of the NPC sub-committee on Rail Transportation headed by Fayette B. Dow in Washington last week discussed results of their survey and prepared a report to the council meeting April 22.

Studies by the sub-committee have disclosed an unusual demand for rail transportation in recent weeks and prospects of further increases because of the unanticipated heavy demand which is taxing industry facilities. It was indicated that while production facilities are adequate to meet this demand, distribution facilities are not and that, because of this, there may be some shortages of gasoline during the coming summer and difficulties in heating oil next winter.

The sub-committee's recommendations to the council likely will include suggestion for a speeding up of tank car production to avoid difficulties next winter in the movement of liquefied petroleum gases.

The sub-committee on Pipe Line transportation of which B. I. Graves is chairman will meet tomorrow to discuss the situation from the standpoint of the industry's own facilities, and on April 15 the sub-committee on Standards of Measurement will meet in New York and the sub-committee on Jet Fuels will meet in Washington.

Burton Wheeler Studies Middle East Oil Charges

Investigation of the Navy's contracts with Arabian American Oil Company during and since the war was turned over by the Senate War Investigating Committee last week to former Senator Burton K. Wheeler of Montana.

Wheeler, whose status with the committee has not been made too clear, will have two weeks in which to study the material committee investigators have gathered, and on the basis of his report the committee then is expected to call extended hearings on the charges made by James A. Moffett, formerly connected with the company, who now is suing Arabian American and its parent companies for more than $6 million for his services in attempting to arrange a deal in 1941 whereby the United States government would relieve the company of the burden of financing Ibn Saud.

At preliminary hearings last month (THE OIL WEEKLY, March 31, 1947), Moffett related his story.

The matter came to the Senate committee after C. W. Barthelmes, formerly a Washington representative of Arabian-American in February questioned the Navy's deal for Middle Eastern crude.

Ide, Crowell Resign

Two of the top men in the Oil and Gas Division are leaving government service. H. Chandler Ide, associate director, is to join Ralph K. Davies in Trunkline Gas Supply Company, and Alec Crowell, director of the production division, is joining E. Holley Poe in Texas Eastern Transmission Corporation.

Cullen Trust Fund to Aid Medical Center, College

H. R. Cullen, Houston oil man, and Mrs. Cullen have announced plans to set up a medical and educational foundation to which they will convey 18,511 acres of oil-bearing or potentially oil-bearing land having an estimated value of $160 million.

Principal recipients are expected to be the Texas Medical Center, Houston, of which Cullen is a trustee, and the University of Houston, the board of trustees of which he heads.

The Cullen foundation is expected to be the largest medical and educational foundation in the South.

Radio Plea Denied

The Federal Communications Commission has denied without prejudice the application of the Petroleum Industry Electrical Association for either new petroleum radio service or new class of petroleum production stations. In denying the request, FCC said it is revising rules governing miscellaneous services so as to provide for establishment of a new industrial radio service, and that the way has been left open for the association to make a later request.

Oil Not Sole Factor in Problem

More realistic appraisals of the Greece-Turkish situation are working to take some of the sting out of charges by opponents of the administration's plan for aid to the two Mediterranean countries that it is aimed at protecting our Middle East oil interests or, alternatively, to save British oil in that area.

State Department officials do not disguise the fact that commercial considerations are a strong motivating influence, but point out that while oil is prominently discussed in connection with the matter it is not the only stake, and United States interests are concerned with other commodities such as chrome from Turkey, tobacco, raw skins, olive oil, etc.; and that our money for years has supported the American College at Beyreuth.

The announced purpose of the program is to prevent the infiltration of Communism in the two countries concerned. Boiled down, it is declared that means simply that the United States does not want the Red "iron curtain" which has cut us off from Eastern Europe extended over the Mediterranean.

Oil, however, will be the major point to be belabored by opponents by the plan since it and Communism are the most popular of all the issues involved.

Assistant Division Managers Are Named by Texas Company

Personnel changes in the Louisiana, Oklahoma, West Texas-New Mexico, South Texas and Rocky Mountain divisions were announced by The Texas Company producing department.

In the Louisiana Division, O. F. Ellzey, district superintendent at New Iberia, was named assistant division manager at New Orleans. Succeeding him is J. A. Rhodes, formerly assistant district superintendent. G. T. Briggs, former division chief clerk at New Orleans, was appointed assistant to the division manager. O. B. Trotter, district superintendent at Houma, was named to the new position of general superintendent of drilling and production, Louisiana Division, and has been succeeded by J. L. Shea, Jr.

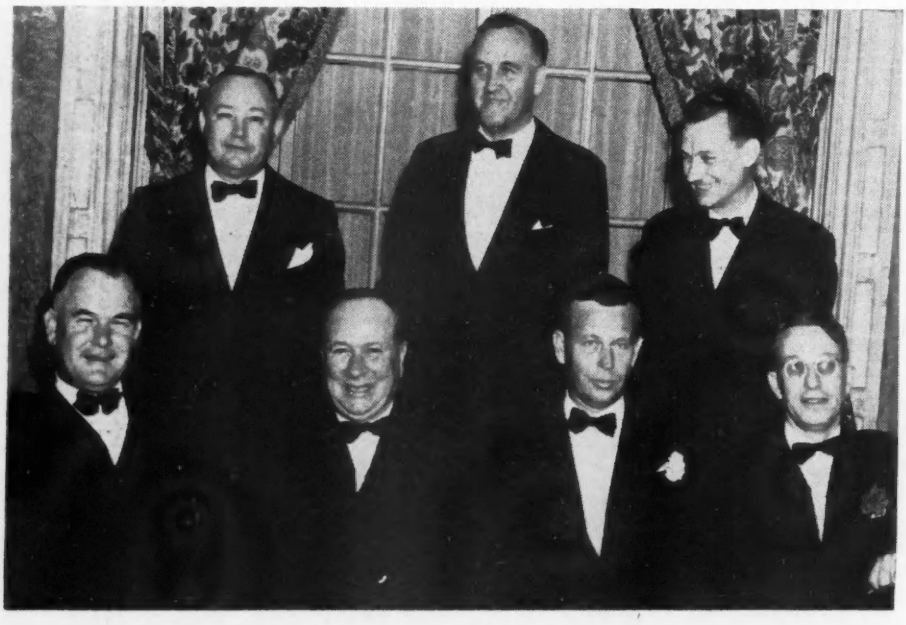
In the West Texas-New Mexico Division, new assistant division managers are J. H. Markley, Jr., former division geologist, and L. F. Shiplet, former geenral superintendent of production in the division. E. M. Rowser succeeds Markley. E. W. Lewis has become division land man and lease man, replacing Tom T. Freeman, transferred to Denver as assistant division manager in the Rocky Mountain area.

In the South Texas Division, Louis T. Tighe was advanced to assistant division manager from the post of general superintendent of drilling and production. He has been succeeded by R. B. Leggett, who has been district superintendent at Hull.

Mark L. Terry, former assistant manager of the Rocky Mountain Division, was transferred to Tulsa as assistant manager of the Oklahoma Division. J. Howard Johnson was named assistant to the Oklahoma Division manager.

In the Rocky Mountain Division, H. B. Gernert, former division superintendent, has been named assistant division manager. J. F. Blackwell replaces him. T. O. H. Matson succeeds Blackwell as division petroleum engineer.

Officers of Los Angeles Nomads



Officers of the Los Angeles chapter of Nomads for 1947 are shown above, left to right as follows: Standing—T. Sutter, Baker Oil Tools, regent; J. A. Engstrand, Grant Oil Tool Company, assistant secretary and Bill Bettis, M. O. Johnston Oil Field Service Corporation, regent. Seated—Fred Ripley, Ideco, vice president; Bob Eiche, export sales representative, president; Waldo Moore, Cavins Company, treasurer; and Earle Boggess, Baker Oil Tools, deputy sergeant-at-arms. Not shown are Lee Laird, Chiksan Company, sergeant-at-arms; B. M. Landis, Web Wilson Oil Tools, secretary, and B. Reinhold, Abegg & Reinhold Company, assistant treasurer.

"Behind the Scene in Baseball" by two umpires and a former pitcher, featured the March meeting at which main committee chairmen were named by President Eiche as follows: Membership, Ernie Fowks; ritual, Fred Ripley; entertainment, Lee Laird; foreign visitors, Henry Pullman; housing, Tom Martin; roster, Bill Bettis.

Manziel Outlet Ready

Pan American Pipe Line Company has completed a 5-mile 4-inch crude line from the Manziel field, Wood County, to connect with its East Texas system in the Quitman area. The Manziel field currently has a base allowable of 2942 barrels daily, and the oil will be batched due to its unusually low gravity.

Pan American acquired the Manziel field gathering system last September from Central Pipe Line Company, and continued to move the oil via tank cars from Mount Pleasant until the oil could be handled through its trunk line to Texas City.

Pipe Line Facilities in Lindsay Field Extended

The deep Lindsay oil field, under intense development in McClain and Garvin counties, Oklahoma, will have adequate pipe line outlet through extension of Empire Pipeline Company's gathering facilities in the area.

The Lindsay area now has nine producing wells, with about that many drilling and a number of additional locations staked. All are within an area approximately two miles wide by five miles long, all served by Empire. The new system includes 13 miles of 6-inch line, with 6 and 4-inch laterals. Five portable pumps are located in the gathering system.

Wyoming Line Sought

The Ohio Oil Company has requested permit from the state of Wyoming for construction of 20 miles of pipe line in the Big Horn Basin. A 13½-mile line is planned from the Hidden Dome field, Washakie County, to the Burlington Railroad, and a 6½-mile line is planned from the Worland field, operated by the Pure Oil Company, to the Chatham pump station on the Grass Creek field-Greybull pipe line owned by Ohio. These fields, discovered during the past year, have had no previous pipe line outlets.

Buys Plantation Line

Keystone Pipeline Company has agreed to pay $497,000 for the extension of the Plantation pipe line running from Greensboro, N. C., to Richmond, Va., the War Assets Administration has announced. It is reported that Keystone will take up the line for re-use elsewhere.

The 179-mile line, which it is estimated would cost $2,472,000 to replace in its present condition, cost the government $4 million.

Rule 37 Order

All Rule 37 permits expire six months after date of order unless employed or utilized within that time, according to a Texas Railroad Commission order effective April 1, 1947. Such permits grant exception to spacing requirements.

New Adams County Outlet Is Planned by Interstate

Interstate Oil Pipe Line Company is purchasing right-of-way for construction of an 18-mile extension of its Mississippi system to serve two producing areas in Adams County currently dependent upon tank trucks for an outlet. Standard Oil Company of New Jersey has contracted for 3-year period ending February 1, 1950, to purchase The Pure Oil Company's distillate production, currently averaging 1000 barrels daily in the Carthage Point field. Interstate will construct a gathering system and an 8-mile 4-inch discharge line from Carthage Point to the LaGrange field, where the company will connect with seven wells that produce 560 barrels daily. A 10-mile 6-inch line will be built from LaGrange to Cranfield station on Interstate's trunk line to Baton Rouge, La.

Interstate's plans to increase the capacity of its carrier from Cranfield station to Liberty station by installing a 10-inch loop has been delayed for lack of pipe.

Cities Service Asks Quick Action as FPC Closes Case

The Federal Power Commission has ended its Kansas City hearings on applications of Mid-Continent Gas Transmission Company, Northern Natural Gas Company, and Cities Service Gas Company for expanded natural gas facilities.

Last week S. B. Irelan, president of Cities Service urged a quick decision saying that "Cities Service has more than six trillion cubic feet of recoverable gas reserve, which assures a supply for many years to come. However, it must be remembered that unless a certificate is granted by June 13 we stand in jeopardy of losing the Stanolind and Magnolia reserves of approximately two trillion cubic feet as well as our priority position on the pipe."

The 26-inch pipe needed for the 405 mile project would be obtained from the A. O. Smith company through Stanolind, he said.

FPC has dismissed Mid-Continent's application for a line to serve Kansas City, St. Paul and adjacent communities and eliminated that company as an intervenor. The Mid-Continent application was withdrawn by the company because of inability to get firm commitments of adequate gas reserves which were previously indicated as available, but it sought to remain a party in the proceedings relating to the other two companies.

New Pipe Line to Serve Eastern Venezuela Areas

Socony-Vacuum Oil Company of Venezuela has the pipe purchased for a 78-mile 12-inch carrier from Guico field in the Greater Oficina area, Eastern Venezuela, which will take care of the company's current production and allow for some expansion. The line will tie in with the Compania Consolidada (Sinclair) line at about Kilometer 37 or approximately 22 miles from Puerto la Cruz.

Planned for an ultimate capacity of 75,000 barrels daily, with two pumping stations, the line initially will operate with only one station located at Guico, ample capacity for current production which is just under 29,000 barrels daily from Guico, Nipa, and Guario fields. The line starts on the savannah country, dropping down off the plateau several hundred feet in elevation before it connects with Consolidada. Its gravity capacity is estimated to be 20,000 barrels a day.

From the origin at Guico it will run through the Nipa field, and then trend slightly west of north until it reaches the Oficina highway near Cantaura and then pass close to the Guario field along the same route now traversed by Mene Grande Oil Company's 16-inch system.

Magnolia Products Line Work to Start May 1

Magnolia Pipe Line Company will receive sufficient pipe this month to start construction May 1 on its projected 183 miles of 12-inch products line from Spindletop, near Beaumont, to Hearne, Texas. This line will connect with 146 miles of 10-inch to be built by The Texas Pipe Line Company from Hearne to a terminal in the Fort Worth-Dallas area, with 155 miles of combination 8- and 6-inch extension from Hearne to San Antonio.

Magnolia awarded construction contract to the Smith Contracting Company, Fort Worth. Work is underway on the tank farm, comprising 1,015,000 barrels of miscellaneous tanks at Spindletop terminal, which will be connected by short lines to The Texas Company's refinery at Port Arthur and that of the Magnolia Petroleum Company at Beaumont.

Wink-El Paso Pipe Line Capacity Now Enlarged

Pasotex Pipe Line Company, transportation subsidiary of Standard Oil Company of Texas, has increased capacity of its 195-mile 8-inch crude line from Wink terminal, West Texas producing area, to El Paso from 21,000 barrels to 26,000 barrels daily by installing four additional booster stations.

This line gained access to an ample supply of crude early in March through completion of a 98-mile 10-inch extension from Wink to available production and natural gasoline in South Ward County and the Yates field, Pecos County.

FPC Hearing Slate

The FPC has postponed indefinitely hearings scheduled April 1 on Memphis Natural Gas Company's application for acquisition of Kentucky Natural Gas Corporation. The Memphis company proposes to submit a revised plan for the consolidation.

On April 15 will be heard the joint application of Home Gas Company, The Manufacturers Light and Heat Company, Cumberland and Alleghany Gas Company and Natural Gas Company of West Virginia for additional facilities including a 130-mile 14-inch pipe line from Coatesville, Pa., to Port Jervis, N. Y., which, with additional compressor capacity, would cost an estimated $6,762,691.

Sunray Line Nearly Ready

Sunray Oil Corporation expects to complete April 15 its 83-mile 8-inch products pipe line from its Allen, Okla., refinery to Drumright where the new line will connect with Great Lakes Pipe Line Company's products line system. Included is a 30,000-barrel daily pumping station at Allen.

Routed through Bristow, the line will receive products at Wilcox Oil and Gas Company's Bristow refinery. Wilcox will have half ownership in the 16-mile stretch between Bristow and Drumright.

WATER-FLOOD TESTS On Long

THIS paper presents the progress of a series of experiments on displacement of oil by water in long consolidated sand cores. The cores, taken parallel to the bedding planes from the Franklin Oil Mine project, are encased in lucite in such a manner as to allow measurements of pressures and electrical conductivities during the tests.

Data from about 60 runs on three different cores of different permeability indicate the differences in saturations and relative permeabilities encountered after flooding at different pressure gradients. Tests were conducted with both completely oil saturated cores and oil-water saturated cores.

AS A result of water-flooding studies during the past several years, most engineers have agreed that there exists a rather important relationship between the pressure gradients or velocity of water encroachment into an oil reservoir and the residual oil saturations in the "watered out" zone. However, the exact nature and magnitude of the relationship have not been settled to the mutual satisfaction of all concerned, despite the fact that a considerable amount of work has been done on the problem. One of the main objectives of the work described in this paper is a study of the effect of pressure gradients upon residual oil saturations after water flooding long, consolidated second Venango sand cores.

The cores being used in this project were selected from those taken from the Franklin Oil Mine project. An effort was made to select cores having as wide a range of permeability as possible. At the same time, only cores of as nearly uniform sand as available were chosen for use in these experiments.

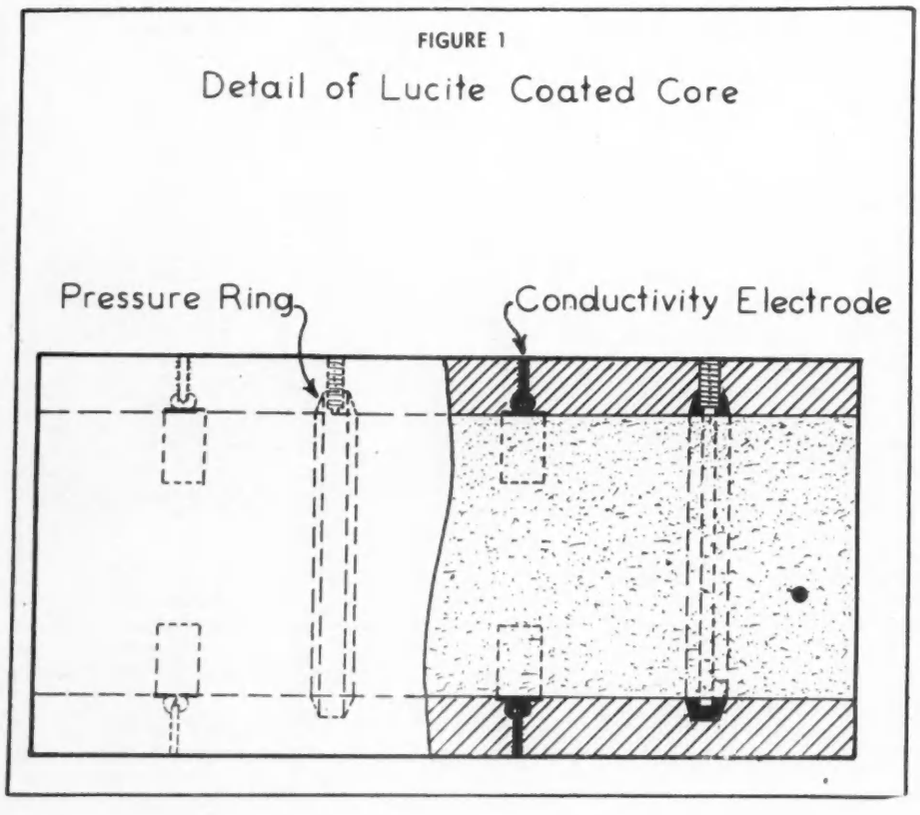
The cores on which the testing was done were mounted in a coating of about ½-inch of lucite, along with pressure rings and conductivity taps as shown by Figure 1. Briefly, the technique employed in mounting the cores was as follows:

The pressure rings were machined from either bakelite or brass tubing, the internal diameter of the rings being such that they fit the core closely. After placing each ring in the desired position, a small amount of casting resin was applied to each side in a continuous film around the core. The casting resin performed the dual purpose of holding the ring firmly in place and excluding the penetration of lucite under the ring during the mounting process.

The conductivity taps consist of strips of gold-plated brass 1¼ inches long by 5/16 inch wide and about 0.005 inch thick. These strips were held in place on the core by means of a wire about its circumference, a large drop of solder applied in the center of each strip, and casting resin applied at the edges of the strips. The casting resin was allowed to harden and the holding wire clipped away as the resin formed a bond to the sandstone strong enough to keep the electrodes firmly in position.

The core with pressure rings and electrodes in position was then placed, properly centered, in a high pressure cylinder designed for the purpose. Lucite powder was poured around the core, heat applied until the temperature was 150° C., and a pressure of 5000 pounds per square inch applied by means of a piston and hydraulic jack. Under these conditions, the powdered lucite flows together and forms a clear impermeable solid, bonding closely to the core. After the mass cools, the mounted core can be extruded from the cylinder and holes drilled and tapped through the pressure rings and into the drops of solder on the conductivity taps. Small machine screws screwed into the lucite to the drops of solder complete the electrical taps, and the holes into the pressure rings are fitted with regular tubing fittings and adapters. The cores were fitted with brass or lucite end plates, having proper connections for fluid inlets and outlets, and made pressure tight against the ends of the core by means of gaskets and steel tie rods.

FIGURE 1



Experimental Methods

The cores were extracted thoroughly before mounting in lucite, but prior to making any flood tests several pore volumes of both naphtha and water were flowed through them to insure that they were cleaned as well as possible. Drying was accomplished by forcing clean dry air through at 80 psi pressure for 12 to 24 hours followed by applying a vacuum on one end of the core and allowing a small stream of clean dry air to enter the other end for about 24 hours.

At the completion of every flood the core was cleaned and dried in the manner described above. The weight of the dry cores never changed more than 0.1 gram between runs, the weight at the end of as many as 30 flood tests not varying more than that amount from the original weight before any tests were made. Hence it is felt that very good reproducibility of the internal surfaces of the core was attained.

Loading of the dried cores was accomplished by applying a very high vacuum to one end of the core until a vacuum gauge on the other end indi-

Presented at the Tenth Annual Secondary Recovery Conference, School of Mineral Industries, The Pennsylvania State College.

By R. A. MORSE and S. T. YUSTER
The Pennsylvania State College
State College, Penn.

Cores

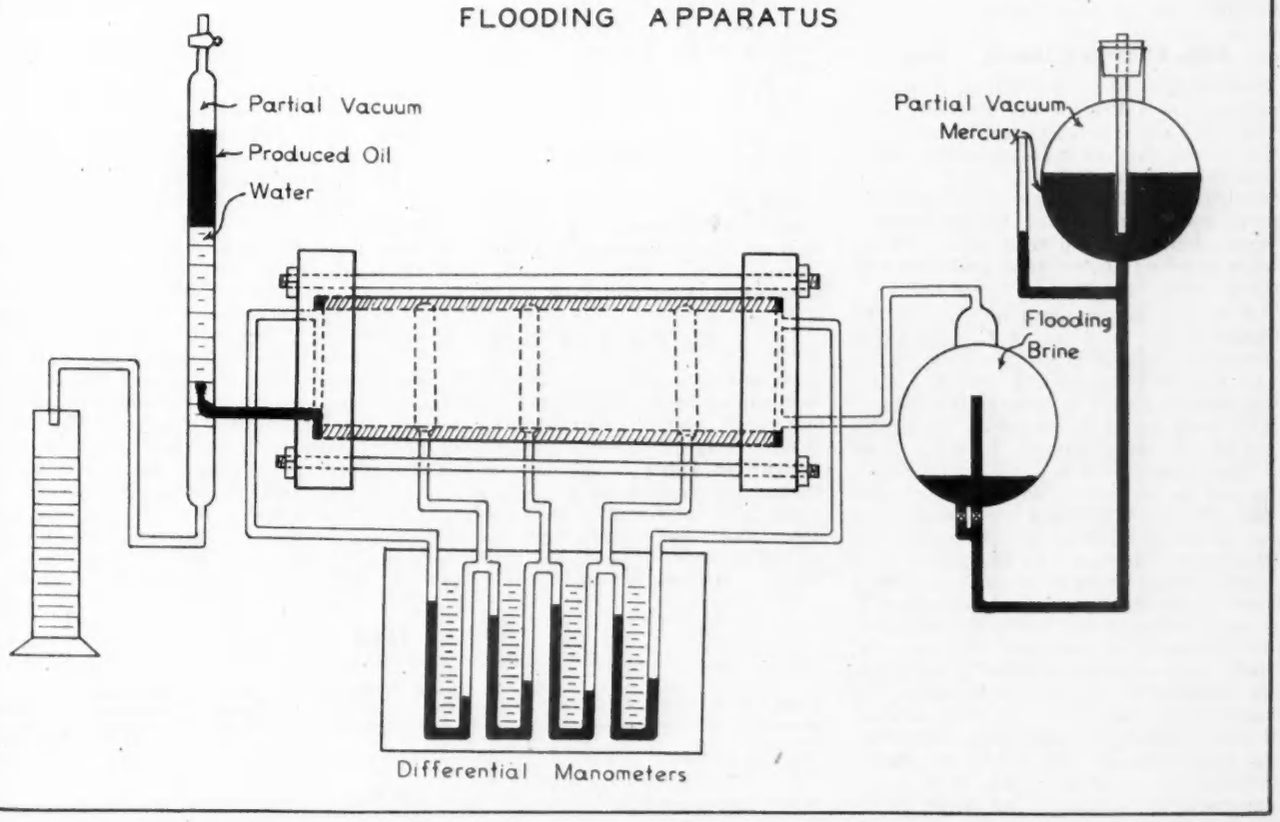
cated almost perfect vacuum, then forcing the saturating liquid into the core under 65 to 85 psi pressure. The vacuum was maintained all through the saturating procedure until liquid appeared at the outlet end, at which time the outlet valve was partially closed, maintaining a high back pressure. By this means any gas which may have escaped from the saturating liquid was forced back into solution. In the tests wherein the core was initially saturated with brine, the weight of the saturated core was determined before proceeding further, in order to determine the water saturation. In every case, whether oil or water was the saturating medium, the saturation was 100 percent ± 0.1 percent, which is the probable error in its determination. For the first series of tests the cores were initially saturated 100 percent with a Bradford crude which had been stripped of light ends by vacuum at room temperature, and several pore volumes of the oil flowed through the core to condition the internal surfaces to equilibrium conditions with dissolved material in the oil. This was found necessary in that the first oil to emerge from the core was very much lighter in color than the oil being injected into the core. Obviously some surface active compounds were being adsorbed by the core. It was believed, and later proved, that these compounds could have an important effect upon the oil recoveries by water flooding. Since it was desirable to have the core uniformly conditioned and also to have the oil in the core as nearly as possible like the original, oil was flowed through until the color of the emergent liquid was the same as that being injected. Five pore volumes were determined to be the minimum volume of oil through to give reasonable certainty of complete conditioning, the time of throughput being about six to eight hours to allow time for diffusion to surfaces not adjacent to flowing liquid. Two different series of tests were conducted, one consisting of water flooding completely oil saturated cores at different pressure gradients, while the same tests were run in the other series on cores saturated with both oil and brine. Three cores of different permeabilities were used in the experiments. The pertinent physical data concerning these three cores with which most of the work to date has been done appear in Table 1.

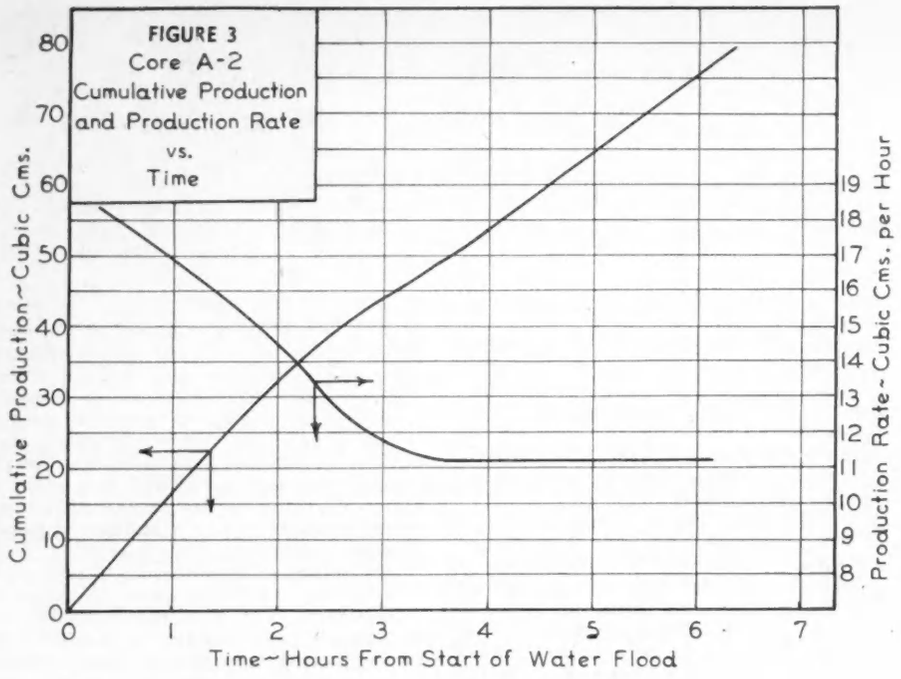
A number of pertinent measurements were made incident to the flood tests. Prior to the water flood an oil permeability of the saturated core was determined as well as the permeability distribution along the core. For this determination it was necessary to measure accurately the pressure at different points along the core. A number of pressure measuring methods was tried, and the differential manometer system pictured in Figure 2 was found to be most satisfactory. The manometer leads are of ¼-inch saran tubing, a fairly rigid tubing having very little volume change with pressures used. The leads and manometers are filled with water except for the volume occupied by the indicating liquid (mercury in all experiments to date). There is a small amount of flow between the manometer system and the core during a water flood; but the amount of flow is very small due to the use of capillary tubing in the manometers, and the volume of this flow can be calculated and a corrective applied to the recovered oil.

After determining the oil permeability,

FIGURE 2

FLOODING APPARATUS





the input end plate was flushed out with the flood water, a brine of 0.25 normal sodium chloride, the same brine used in saturating the cores originally, and the outflow end plate drained completely of oil and the flood started.

On the early runs the oil was collected in a burette by draining out of the end plate through the outlet tube which was inserted through a cork in the top of the burette. Pressure relief in the burette was provided by a wire inserted between the cork and the glass of the burette top. It was feared that even this system might allow substantial evaporation, so the collecting mechanism pictured in Figure 2 was substituted. No substantial difference in recovered oil was noted with the change in collection devices.

Data Observed During Tests

Throughout the water flood, measurements were taken of the pressure distribution, and the electrical conductivities of the various sections were determined on Core A-2, the only one on which the conductivity taps were in good condition. Rates of production were calculated from readings of cumulative production volumes and times of observation.

A typical set of data on one of the water floods of Core A-2, completely saturated with oil, is presented in graphical form in Figures 3, 4, and 5. Figure 3 is merely a plot of cumulative volume of oil and water collected at the outlet end vs. the time elapsed from the start of the water flood and the rate of production curve calculated from the same data. Figure 4 showing the position of the oil-water interface vs. the volume of oil produced is based on the assumption that the same amount of oil is produced from each element of the core, that is, a straight-line relationship is assumed for the function graphed. In order to check the validity of this assumption, the volume of oil produced when the water front was first picked up at each of the conductivity taps was plotted on the graph. Since the points fall fairly well on the assumed line, this graph was used to locate the oil-water interface in plotting the pressure distribution patterns in Figure 5. The pressure distributions were plotted by first spotting the actual pressure readings and merely connecting the points representing the pressures in the sections not including the interface. The position of the interface was located exactly by the use of Figure 4, and the curves extended from the completely oil saturated end by the use of pressure drop ratios in the completely oil saturated side taken from a pressure distribution curve before the water flood was started. The extension of the pressure from the water encroached side was determined from pressure drops immediately after the water flood had passed the section, with a correction applied for the change in rate. The break in the pressure curve at the position of the oil-water interface is consistently the same, about two centimeters of mercury, regardless of position in the core, and, hence, independent of the rate of advance. The very close correlation between this pressure drop and the threshold pressure of the core leads to the conclusion that in the range of velocities studied, it is a function only of interfacial tension of the liquids used, contact angles, and the average pore diameter of the core.

Correlation of Data

A summary of the pertinent data on saturations before and after water flooding, and relative permeabilities at different stages of the experimentation appears in Table 2. The data shown represent the results of 42 separate tests, only about half of those made. Data from many early runs were deleted due to variations caused by experimental changes necessary during the development of the technique. There appears to be no regular change in residual saturations over the range of pressure gradients investigated, although the range extends well below the minimum gradients used in any present-day operations and far above the maximum gradients possible of field application. The maximum deviation over the entire range of pressure gradients studied is about 3 percent residual oil saturation on the originally completely oil saturated cores, which, it has been proved by duplicate runs, is near the limit of reproducibility of results in these experiments.

The data from the studies of cores saturated with both oil and water likewise indicate a variation between runs of only slightly greater magnitude. It appears probable from examination of the data that the differences in original oil and water saturations contribute a substantial part of this variation. On both series of experiments, it was possible to duplicate results more closely on the homogeneous Core A-2 than with either of the other two cores. Even recognizing the maximum variations in all runs, however, it cannot be stated that any difference of major magnitude is attained by variation of pressure gradients in flooding the sandstone used in these experiments.

Recovery Vs. Pressure Gradient Experiments

These findings did not coincide with the results obtained by flooding radial Bradford cores at different pressure gradients. In an effort to determine whether or not this difference in behavior was due to the type of sand used or the geometry of the flow system, a radial core was cut from the same long core from which A-2 was taken, and, using it, a series of recovery versus pressure gradient experiments such as those described by Calhoun, McCormick and Yuster[1] was performed. The core in these runs was initially completely saturated with Bradford crude. The data appearing graphically in Figure 6, Curve 1, indicates the presence of the same relationship shown to exist in radial core floods of the Bradford sand. The minimum oil saturation attained, however, was several percent higher than the residual saturation found after flooding the linear system. It was believed that possibly the difference was due to the conditioning given the long core by flooding several pore volumes of oil through after the original saturation. Hence, a duplicate set of experiments was performed in which the radial core was first saturated in the usual manner, followed by flowing five pore volumes of oil through before water flooding. The data from these experiments are presented as Curve 2, Figure 6. Not only was the effect due to pressure gradient variation considerably lessened, but the minimum residual oil saturation was very close to that obtained in the linear system of the same sand. It was concluded from

TABLE 1

CORE No.	Length Cm.	Diameter Cm.	Porosity Percent	Permeability Millidarcies	Remarks
A-2	22	5.4	16.5	31.1	Fairly Homogeneous
A-4	23	5.4	11.1	425	Very Heterogenous
A-5	27	5.4	11.0	253	Very Heterogenous

these data that the effect of pressure gradients upon oil residuals after water flooding a radial system, with the sand studied, is due almost entirely to the capillary end effect as was pointed out as a probability in the previously mention paper by Calhoun, McCormick and Yuster. The lowering in final oil saturation by flowing several pore volumes of oil through prior to water flooding is attributed to the lowering of oil-water interfacial tension (and hence the forces of capillary retention) caused by polar compounds adsorbed on the sand from the circulated oil.

Relative Permeabilities

One point to be noted from Table 2 is the relative permeabilities listed. It is readily apparent from the relative permeabilities to water and oil that the sandstone used is preferentially wet by water. Even when oil is originally in contact with the sand, water tends to replace it as the wetting phase, given sufficient time, as demonstrated by the very low permeabilities to water in the low grandient runs on A-2. Even when the flood velocity was great, as in the high gradient runs, the relative permeabilities to water never approached a value more than one-fourth of the permeability to oil at the same saturations. The higher relative permeabilities to water in Cores A-4 and A-5 might be attributed to the much higher absolute permeabilities causing the flood to traverse the core before equilibrium of wetting forces was established. It is demonstrated by the water permeabilities from the tests in which the cores were originally saturated with brine, flooded with oil, and then water flooded, that there is very little tendency toward oil wettability.

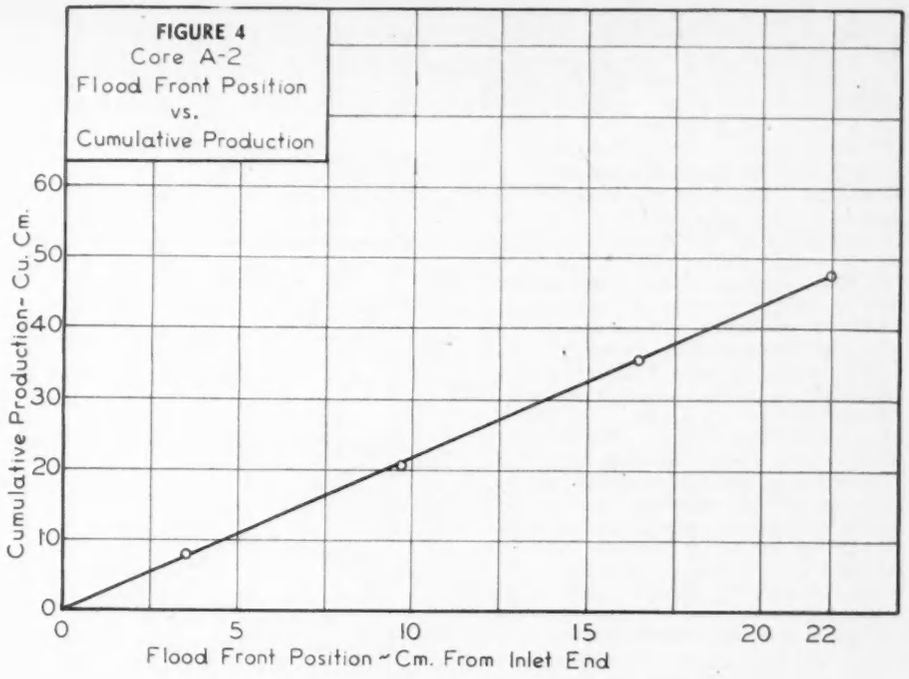


FIGURE 4
Core A-2
Flood Front Position
vs.
Cumulative Production

Correlation With Other Data

Due to the abnormally high residual oil saturations noted in all the experimental floods, it was deemed advisable to compare the results with laboratory tests on other sand types. Since a good correlation was observed between the oil saturation attained by flooding a long core and the minimum attainable in a radial core of the same material, comparison was made with the work done previously in this laboratory on radial cores of Bradford sandstone. Average values of residual oil of 31 percent were observed after water flooding a number of completely oil saturated Bradford cores of a wide range of permeability, whereas the residual oil saturations shown in Table 2 for the same type of test are nearly all in excess of 40 percent. Also, it was found that presence of interstitial water in the Bradford cores greatly reduced the residual oil saturation after water flooding. One of the long cores, A-2, actually had substantially higher residual oil saturations after flooding with interstitial water present than when there was no water saturation prior to the flood, and neither of the other cores showed marked reductions such as were observed in the Bradford cores. The differences in floodabilities, it must be stressed, cannot be attributed to the physical and chemical characteristics of the oil used because the same Bradford crude, stripped of its light ends, was used in both series of experiments.

A report was available* of a water flood experiment on a long core of Chipmonk sandstone (a Bradford type sand) drilled from a surface outcrop. The core had a length of 29.75 centimeters, diameter 10.55 centimeters, air permeability at one atmosphere 2.6 millidarcies, and a porosity of 14.3 percent. The outside of the core was coated with several layers of lacquer, and saturation achieved by evacuating, loading with brine, and flowing oil through until saturations were as follows: oil, 56 percent; water, 39.5 percent, and gas, 4.5 percent. The core was then water flood-

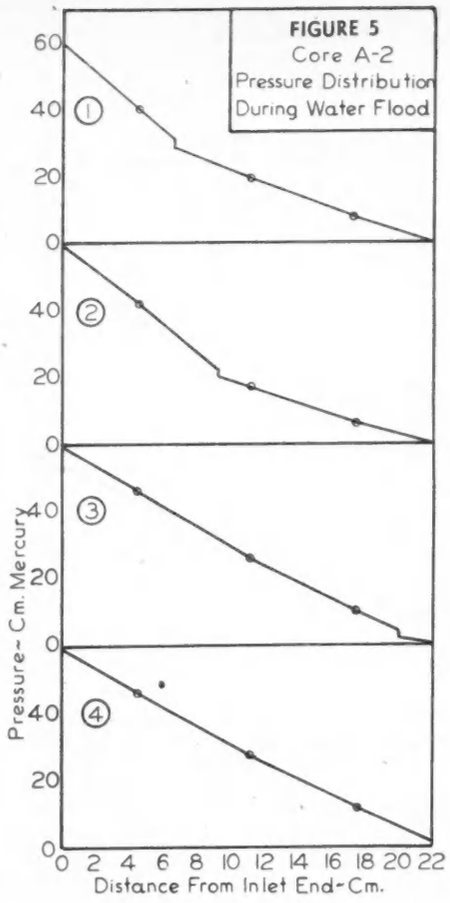
TABLE 2

Core No.	Run No.	Pressure Gradient psi/ft.	Original Saturation—Percent		Final Saturation—Percent		Approximate Relative Permeability	
			Oil	Water	Oil	Water	To Oil Before Water Flood	To Water After Water Flood
A-2	1	0.69	100	.....	39	61	.....	3.4
A-2	2	1.17	100	.....	39.2	60.8	.....	.....
A-2	3	1.17	100	.....	40.5	59.5	.....	7.5
A-2	4	3.72	100	.....	39.7	60.3	.....	.....
A-2	5	7.31	100	.....	39.6	60.4	.....	9.7
A-2	6	14.6	100	.....	38.9	61.1	.....	10.6
A-2	7	32.1	100	.....	39.3	60.7	.....	.....
A-2	8	110	100	.....	40.0	60.0	.....	13.2
A-2	9	0.58	64.2	35.8	48.8	51.2	38	2.3
A-2	10	0.98	62.8	37.2	46.6	53.4	39	2.2
A-2	11	0.98	62.8	37.2	46.9	53.1	47	2.3
A-2	12	0.98	63.7	36.3	48.0	52.0	49	2.0
A-2	13	2.94	62.8	37.2	46.3	53.7	46	2.3
A-2	14	5.37	62.8	37.2	47.2	52.8	48	2.2
A-2	15	10.7	62.8	37.2	44.4	54.6	50	1.9
A-2	16	10.7	62.8	37.2	45.0	55.0	41	2.2
A-2	17	16.1	64.0	36.0	45.7	54.3	47	1.8
A-2	18	32.1	65.5	34.5	47.5	52.5	.....	2.7
A-2	19	110	64.3	35.7	45.7	54.3	.....	.....
A-4	1	0.375	100	.....	51.2	48.8	.....	.....
A-4	2	0.935	100	.....	49.5	50.5	.....	26
A-4	3	1.87	100	.....	50.0	50.0	.....	35
A-4	4	2.7	100	.....	53.4	46.6	.....	35
A-4	5	106	100	.....	51.0	49.0	.....	.....
A-4	6	0.47	65.5	34.5	38.2	61.8	.....	.....
A-4	7	0.94	66.3	33.7	37.2	62.8	58	2.1
A-4	8	0.94	69.0	31.0	40.4	59.6	60	2.1
A-4	9	0.94	71.0	29.0	44	56.0	63	5.4
A-4	10	1.88	68	32.0	39.8	60.2	.....	.....
A-4	11	2.81	66.3	33.7	36.9	63.1	.....	4.5
A-4	12	5.2	68	32	40.5	59.5	59	7.1
A-5	1	0.48	100	.....	45	55	.....	26
A-5	2	0.80	100	.....	48.3	51.7	.....	43
A-5	3	1.61	100	.....	45	55	.....	35
A-5	4	91	100	.....	47.8	52.2	.....	.....
A-5	5	0.40	68	32	42.3	57.7	69	3.3
A-5	6	1.12	68	32	42.0	58.0	69	1.9
A-5	7	1.12	68	32	39.0	61.0	71	2.4
A-5	8	1.6	67	33	43.0	57.0	72	3.4
A-5	9	1.6	66.5	33.5	36.5	63.5	.....	.....
A-5	10	1.6	65	35	40.5	59.5	59	2.0
A-5	11	4.4	66.5	33.5	36.5	63.5	69	2.0

ed at a pressure gradient of 5 psi per foot, the residual oil saturation following the flood being 16.5 percent, which is very close to the average residual saturations reported on the tests on radial Bradford cores saturated with both oil and water prior to water flooding.[2]

Probably the most important conclusion to be drawn from the work reported here is that important factors other than heterogeneity of permeability and high water saturations are responsible for the fact that Venango sand is not susceptible to water flooding. Even core A-2, which is probably as homogeneous as any sandstone to be found, displays characteristics of very high oil retention regardless of the presence or absence of interstitial water with the oil. There is little doubt that even if the sandstone from which these samples came were homogeneous as to permeability and porosity as well as relatively water-free it would still not be economically feasible to recover by water flooding the oil remaining after primary depletion.

At the present time no definite laboratory criterion has yet been developed to enable a positive prediction as to the susceptibility of a reservoir rock to water flooding. Flood tests on radial cores at high pressure gradients provide reasonable agreement with long core floods, and at least qualitative agreement with actual field performance as to ultimate saturations expected.



Summary and Conclusions

The work presented represents the data obtained from 42 water flooding tests on three different long Second Venango sand cores of widely differing permeabilities. Two series of tests were conducted, one in which the sand was saturated completely with Bradford crude before water flooding, and the other series consisting of flooding the same cores in which interstitial water was present with the oil. The conclusions drawn from the work are:

1. Second Venango sand could not be profitably water flooded even if it were of homogeneous permeability and contained very favorable saturations of oil and water. Some other physical or chemical characteristic of the sand is more important than either of these in making it unsusceptible to water flooding.

2. It is possible that the presence of interstitial water in conjunction with the oil in a sand can actually cause higher residual oil saturations after water flood than the oil residuals attained after flooding the same sand in which no water is present. This is contrary to any data found on previous laboratory flood tests. This phenomenon was noted on core A-2, permeability of 31 md, and of uniform characteristics throughout. The reason for this behavior is not apparent at the present time.

3. With the materials used there is no measurable effect of flooding gradients or velocities upon residual oil saturations attained by water flooding.

4. The physical and chemical properties of the oil in a sand, especially the presence of polar compounds dissolved in the oil, have a substantial effect on recoveries of oil by water flooding.

5. Flood tests on radial core samples offer a fair evaluation of the floodability of a sand. However, a high pressure gradient must be used, and the core must be brought to equilibrium with the saturating oil by flowing several pore volumes of the oil through prior to water flooding.

One point that must be stressed is that the behaviors described in this study are those of a sand not susceptible to water flooding. In order to understand properly the mechanism whereby oil is produced efficiently by water displacement, the experimental work described must be extended to include performance studies of sands known to be susceptible to water flooding.

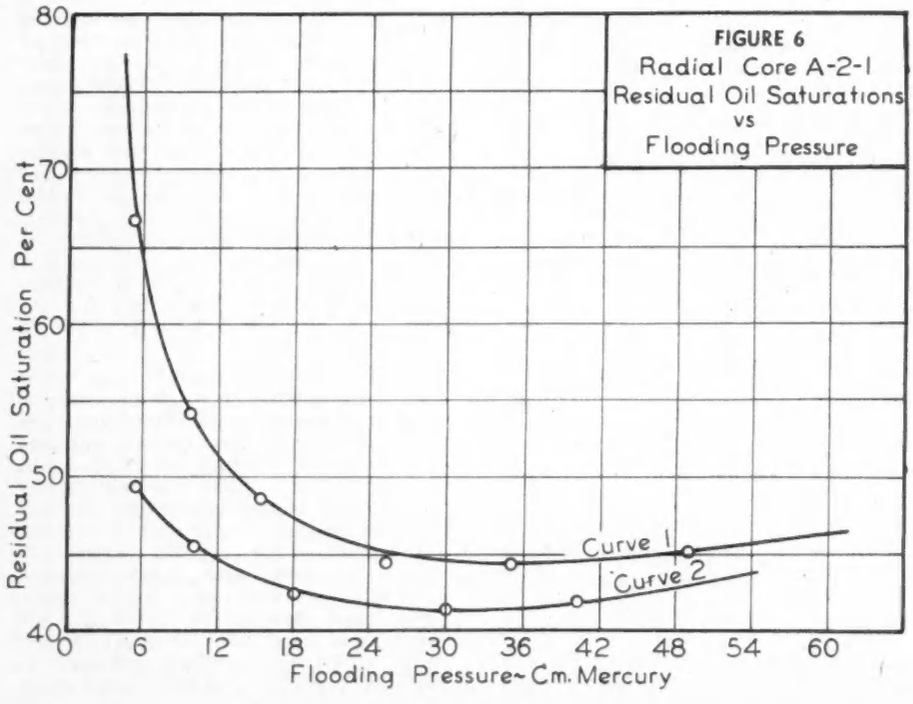
Acknowledgment

The authors wish to acknowledge the assistance given by Venango Development Corporation who furnished the cores with which the experimental work was done. Discussions with and suggestions offered by other members of the petroleum department have been invaluable in the development of this project. The work was supported in part by The Pennsylvania Grade Crude Oil Association.

REFERENCES

[1] Calhoun, McCormick and Yuster, "The Effect of Pressure Gradients and Saturations on Recovery in Water Flooding"—Proceedings of Eighth Annual Technical Conference on Petroleum Production, The Pennsylvania State College, 1944.

[2] Progress Report for Period Ending January 31, 1944, describing experiments of A. P. Clark.



COMING SOON

Recent Experiments in Air-Gas Driver Recovery

By D. E. Menzie, R. F. Nielsen and S. T. Yuster

WATCH FOR IT!

Pipe Lines of the U. S.

Pacific Gas & Electric Company

Ninth of a Series

Unconformities to Play Major Role In Arkansas-North Louisiana Discoveries

Part 2

Regional Truncation in Arkansas and Northeastern Louisiana

By
MICHEL T. HALBOUTY
Consulting Geologist and Petroleum Engineer, Houston
and
GEORGE C. HARDIN, JR.
Geologist and Petroleum Engineer, Assistant to Michel T. Halbouty

OIL has been produced in considerable quantity from Arkansas since 1921 and 1922 when the El Dorado, Irma, and Smackover fields were discovered. Almost all South Arkansas production has come from structural highs, but some of it may be credited to stratigraphic traps associated with local uplifts. To date, no oil of note has been produced from shoreline traps associated with regional unconformities, but it is the opinion of the writers that this type of trap will be very important in future discoveries in this area.

The entire Lower Cretaceous (Commanche) and Jurassic stratigraphic sections are truncated along approximately east-west or northwest-southeast lines in southern Arkansas and the eastern part of North Louisiana (Figure 5). The truncated edges of these older formations are covered for the most part by the Upper Cretaceous (Gulf) beds. With the exception of the Delhi area where truncated Paluxy sands produce oil, no production of note has been obtained from the truncated edges constituting the northern limits of these truncated formations as shown on Figure 5. Production has been obtained, however, from truncated beds around local uplifts. Prolific production from the Delhi and East Texas fields and from several fields in the Mid-Continent region attest to the potentialities of the type of trap associated with regional unconformities.

Depositional Characteristics

The Lower Cretaceous and Jurassic formations change in depositional characteristics from littoral and nearshore, shallow water deposits in Arkansas into offshore, shallow water deposits southward into Louisiana and southwestward into northeast and East Texas. The littoral deposits are characterized by red beds, sandstone, conglomerates, reef limestones, anhydrite and salt, and the offshore deposits by dark shales, thin bedded limestones, anhydrite and salt. There is a much greater thickness of sediment in Louisiana and northeast Texas than in Arkansas.

The Jurassic beds consisting of the Cotton Valley, Buckner, Smackover, and Eagle Mills* formations never reach the surface in this region but were truncated prior to Gulf Cretaceous time and the entire section subsequently covered by Gulf Cretaceous and Eocene formations (Figure 6). The Buckner formation, consisting principally of red shale, anhydrite, dolomitic limestone, and some fine grained sandstone, and the Eagle Mills formation, consisting principally of red beds and rock salt, are not productive of oil to date† and the prospects for finding oil in these two formations does not appear to be favorable. However, there are definite prospects of finding production along the truncated edges of the porous oolitic limestones of the Smackover formation and the sands of the Cotton Valley formation. Along the line of truncation of these two formations, any southward trending nose or lateral lenticularity of the sediments that would afford lateral closure probably would result in a trap in which oil and gas would be found.

Reynolds Oolite Production

Most oil production from the Smackover limestone has come from the Reynolds oolite member (uppermost Smackover) in the area south of the major fault zone that crosses southern Arkansas about 25 miles north of the Arkansas-Louisiana border. This fault system is considered by most geologists to be a northeastward extension of the Luling-Mexia-Talco fault system of Texas.[1] Prior to discovery in January, 1942, of the Midway field, Lafayette County, Arkansas, north of this fault zone, many geologists considered this northern area to be unfavorable for Smackover production. The presence of highly permeable and porous oil-bearing oolitic Smackover limestone in the Midway field north of this fault zone proved that the Smackover limestone of this area is a favorable zone for oil accumulation. Not only did the discovery of the Midway field prove that the upper part of the Smackover (Reynolds oolite member) is productive in this area, but the discovery well — Barnsdall Oil Company's E. S. Rond 1—penetrated an entirely new producing zone of porous granular limestone lying approximately 50 feet beneath the Reynolds zone.[2] The discovery of the Midway field stimulated exploration for oil in the northern marginal areas of the Smackover formation. To date, no stratigraphic or shoreline traps have been discovered in this area, but there is little doubt that such traps exist. Favorable areas for exploration exist in Washita and Nevada counties where reintrants occur along the line of Smackover truncation. A detailed study of the subsurface geology along the marginal areas of the Smackover formation should reveal other favorable areas. Fields in which production is now obtained from formations lying above the Smackover are potential prospects for Smackover production, and these fields will certainly be eventually tested for such deeper possibilities.

The Cotton Valley formation is productive of oil in the Schuler, Atlanta, Mt. Holly, Dorcheat-Macedonia, Magnolia, McKamie, New London, and Salem Church fields in Arkansas and a number of fields in North Louisiana. The area immediately north of the Arkansas-Louisiana border has been considered the most favorable for Cotton Valley production. Northward in Arkansas, the Cotton Valley formation thins markedly and becomes considerably coarser. There are fewer beds in the Cotton Valley of this northern area that could serve as source beds but this condition does not exclude the area from consideration for potential Cotton Valley production. At some future date, it is probable that the discovery of a prolific Cotton Valley field in this northern area will stimulate the search for Cotton Valley production just as the opening of the Midway field stimulated the search for Smackover production in the area.

Lower Cretaceous

Of the Lower Cretaceous beds truncated in southern Arkansas and North Louisiana, the Paluxy, Rodessa, and Sligo formations offer the best possibilities for commercial production. At pres-

* The Eagle Mills formation is considered to be of Permian age by some geologists.
† Some geologists consider part of the producing section of the Ohio Oil Company's No. 1 DeLoach 22-23N-8W to be Buckner but it is the opinion of the writers that this zone is part of the upper Smackover.

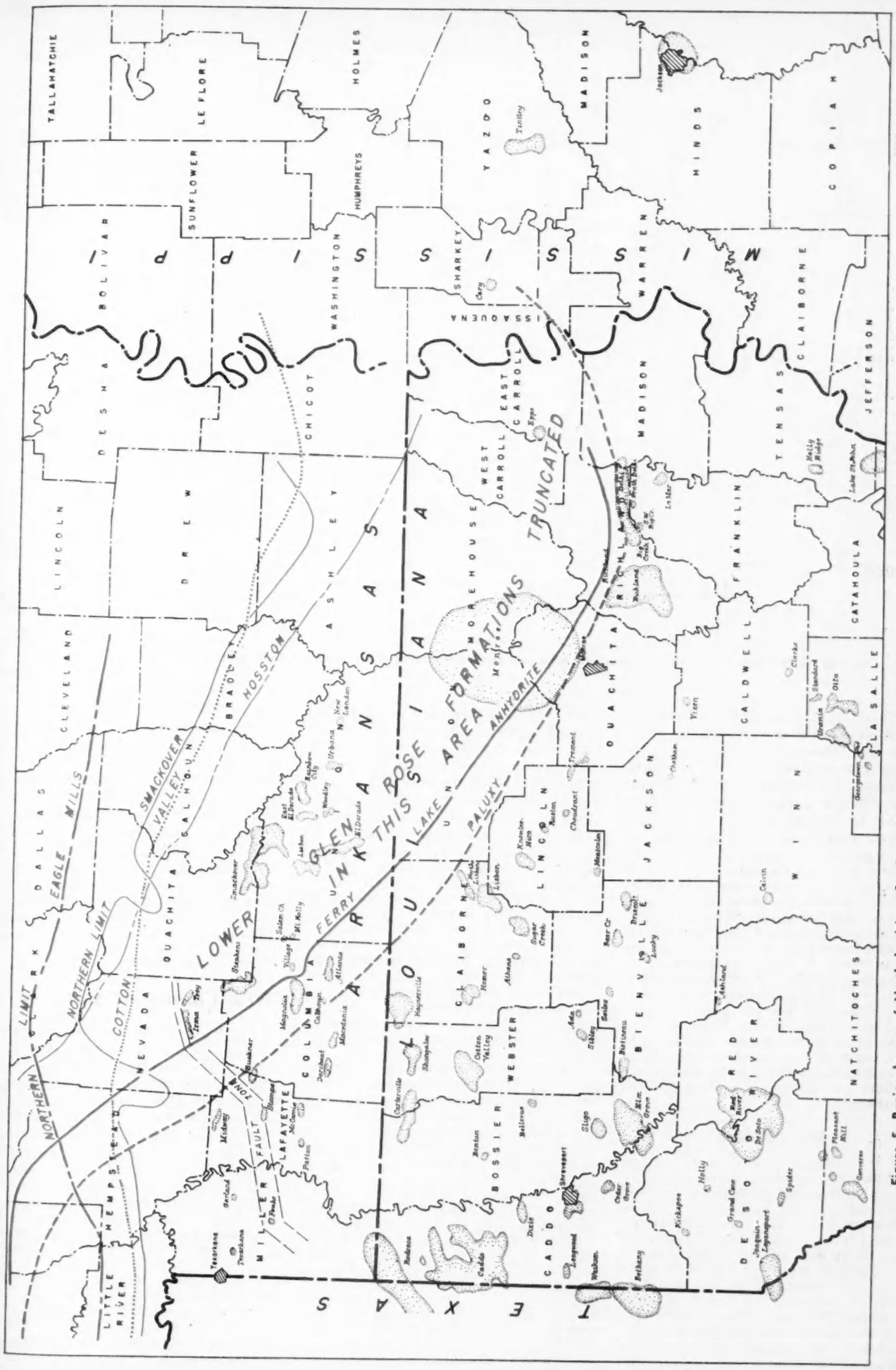


Figure 5. Regional map of North Louisiana-Southern Arkansas area showing northern limits of truncated Lower Cretaceous and Jurassic formations.

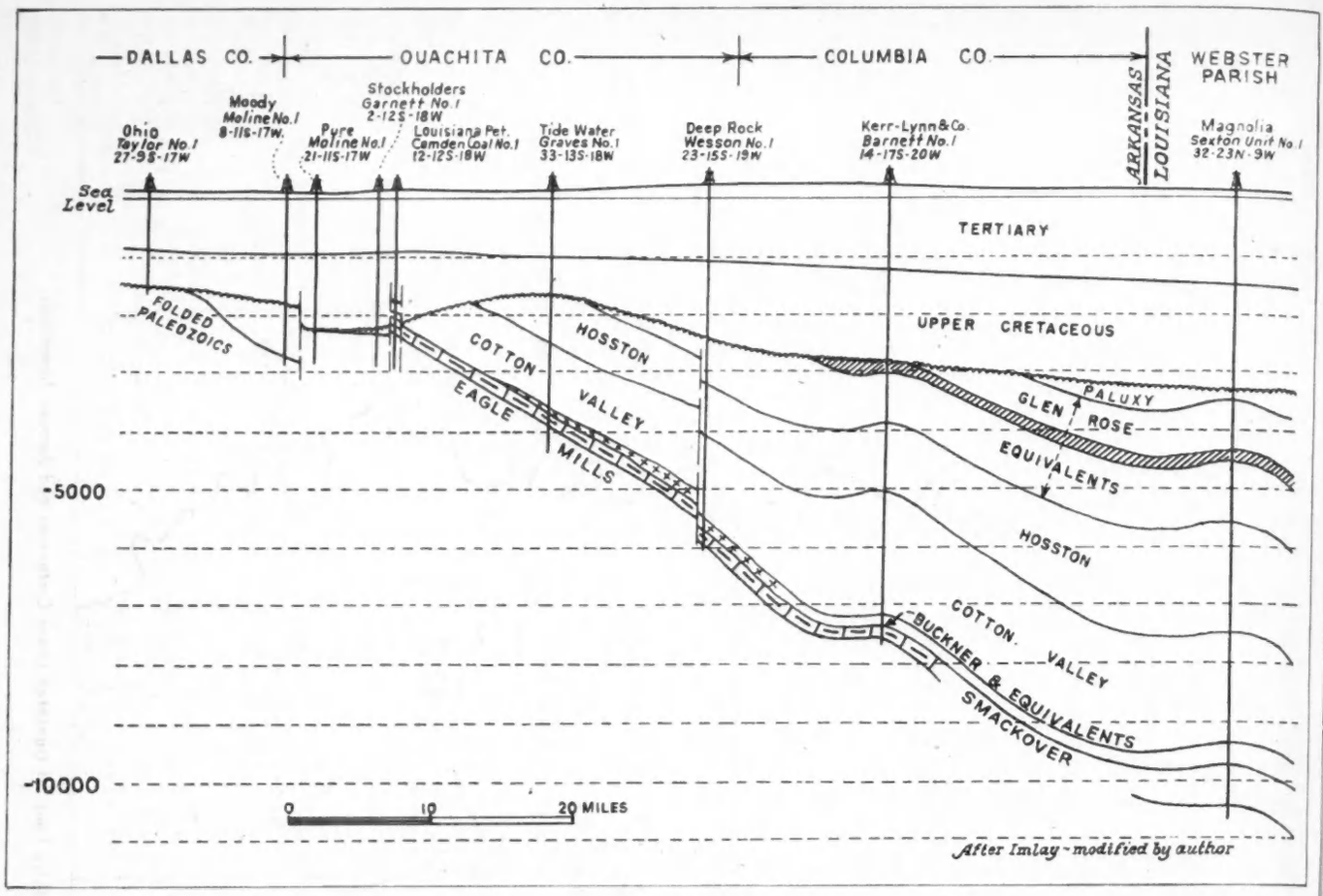


Figure 6. North-South section through southern Arkansas showing truncated and overlapped lower Cretaceous and Jurassic formation.

ent, these formations are producing in the Rodessa, Fouke, Lewisville, Spirit Lake, and Mount Holly fields of Arkansas and in several fields of North Louisiana. Oil accumulation in several fields of South Arkansas is partially controlled by stratigraphic traps. These traps, however, are largely the result of sand lens and cannot be considered the result of regional truncation.

In addition to the excellent possibilities of finding production along the truncated edges of the Paluxy, Rodessa, and Sligo formations where local structure affords lateral closure, the lenticularity of the porous zones of these formations offers an excellent chance for oil accumulation. If any well should locate a porous zone that pinches out laterally near the truncated edge of one of these formations, it would seem logical for the operators to move northward and attempt to find the truncated edge of this lens because of the excellent possibility for finding production therein.

Study Needed

In exploring for traps along the line of truncation of these potentially productive formations, geophysics will aid considerably in the location of noses or local anomalies which may afford lateral closure for the truncated beds. However, it is the opinion of the writers that a very detailed study of the subsurface geology in these areas will be more beneficial, and thereby result in more discoveries than geophysical work, because the majority of the future oil discoveries in this region will be more stratigraphical than structural in character. Such traps are more amenable to a geologic study than to one of geophysics. Either with or without geophysics, a detailed study of the subsurface geology in the areas along the lines of truncation is a prime requisite for successful exploration. Such a study should particularly include the examination of all available well cuttings and cores for clues to lenticular porous zones near the truncated edges. A complete understanding of the sedimentational and paleogeographic conditions prevalent at the time of deposition of individual horizons is the keynote to such a successful study. Accurate location of old shorelines and an analysis of the sedimentational conditions existing during emergence and submergence of local areas will point the way toward the location of stratigraphic oil traps, which are largely the result of sedimentary factors that existed during deposition, or of the manner in which the land mass was eroded during truncation prior to resubmergence.

Exploration for traps along the truncated edges of these Lower Cretaceous and Jurassic formations in Arkansas might be expressed as "playing a long-shot." However, very few wells will have to be drilled below 3000 feet, thereby limiting the cost of exploration considerably, and the likelihood of a discovery of a field of the Delhi or East Texas type makes the gamble well worth while.

[1] Sellards, E. H., and Hendricks, Leo; Structural Map of Texas, Texas Bureau of Economic Geology, 1946.

[2] Markley, E. A., and Valerius, C. N., AAPG Bull., July, 1942.

EDITOR'S NOTE: Predictions were made by the authors in Part 1 of this article (THE OIL WEEKLY, *March 31*) *that extensions would be found in the Delhi area where sands other than those now producing are truncated. On March 20, Gulf Oil Corporation completed Lee Donnell 2 approximately ½ mile northeast of the Lee Donnell 1, shown in Figure 3, Part 1, of this article. This well was completed in the Paluxy sand shown as a salt water sand on Figure 3. Initial production from the well was 243 barrels of 39.7-gravity oil daily through 3/16-inch choke with gas-oil ratio of 305/1.*

NPA Convention Slate

Speakers at the semi-annual meeting of the National Petroleum Association, at Hotel Cleveland, Cleveland, Ohio, April 17 and 18, have been announced by Fayette B. Dow, general counsel. They will include John D. Clark, member of the council of economic advisers to the president, who will discuss "Future Economic Trends." C. J. Bauer, Standard Oil Company (New Jersey), will discuss "Foreign Petroleum Refining," and Max W. Ball, director, Oil and Gas Division, Department of Interior, will speak on "Activities of the Oil and Gas Division."

A round-table discussion on "The Outlook in Labor Relations" will have as discussion leaders Thomas G. Patton, general counsel, Republic Steel Corporation; J. W. Rees, personnel director, The Pure Oil Company, and Donald C. O'Hara, NPA attorney.

AN EVALUATION OF

Present-Day Geophysical Exploration

FOR OIL

Part 4 (Conclusion)

By SYLVAIN J. PIRSON

Thermal Methods

THE presence of a geological structure in the thermal field of the earth is often accompanied by a disturbance of the normal geothermal gradient, namely a regular increase of rock formation temperature with depth. This gradient may be expressed by the number of feet of depth required to observe a temperature increase of 1° F. It is natural to expect that the depth rate of temperature increase will be a function of the types of rock through which heat flows in its escape from the center of the earth.

A geological structure by the introduction of lateral discontinuities within the sediments disturbs the normal thermal field. Structures with an igneous core or a salt dome are most typical of those which produce an increase of the geothermal gradient as a result of the greater heat conductivity of salt and igneous rocks over that of normal sedimentary rocks.

Sediments themselves have the property of being thermally anisotropic, i.e., they conduct heat more readily in a direction parallel to the bedding plane than at right angle to it. Hence, convex beds over a structure will concentrate the heat escape toward the apex of the structure with the result that an appreciable increase in the geothermal gradient may be observed.

The above considerations would indicate immediately the possibility of locating buried geologic structures by means of the measurement of the geothermal gradient in a prospective oil and gas territory. There are, however, a number of difficulties. The thermal field of the earth does not become static before a depth of at least 100 feet is reached on account of the transient heat flow produced by daily and seasonal variations. The geothermal gradient being dependent upon the nature of the rocks within which it is measured, it is necessary to make the measurements within a geologic formation of constant thermal characteristics or at least to make corrections for the heat conductivities of the various rocks within which the measurements are made. Hence, a systematic search for oil and gas structures by the geothermal method would require drilling relatively deep test holes (100 feet or more) and the testing of the heat conductivity of core samples under conditions prevailing when in place. The field work would be slowed further by the necessity of letting the test holes come to thermal equilibrium after the disturbance created by the drilling operations. There is, however, a possibility of carrying out such measurements in conjunction with a core drilling or a seismographic exploration campaign.

It is doubtful that geothermal exploration by itself would prove to be an economical proposition.

(b) Bore-hole Exploration

When a well has been completed and more particularly if dry, it is of great interest to derive from it the maximum amount of information, not only geological (stratigraphic tops and thicknesses, paleontologic, mineralogic, etc.), but also geochemical and geophysical. The geochemical information which may be derived from a well has already been largely discussed in a previous section under the direct approach to prospecting. The strictly geophysical bore hole tests which may be of significance for the location of oil and gas reservoirs may be enumerated as follows:

1. Electric logging:
   (a) resistivity and impedance logging
   (b) spontaneous potential (S.P.) logging including dipmeter
   (c) anisotropic conductivity testing
2. Radioactivity logging:
   (a) gamma ray logging
   (b) neutron logging
3. Magnetic logging and core orientation
4. Geothermal logging

1a. Resistivity and Impedance Logging

In subsurface geological studies for long distance correlation of a regional nature as well as for local stratigraphic and structural studies, it is unquestionable that the tool which has contributed the most to supply information otherwise unavailable by strictly geological methods is electric logging in its various forms. Bore hole electric logging consists essentially in measuring two parameters, one depending on the formation's electrical resistivity and the other the so-called "spontaneous polarization" potential.

The former may be measured by means of direct or alternating current. When direct current is used a *resistivity log* is obtained in practice by lowering a set of three electrodes suspended by a three-lead insulated cable. The electrode assembly is first lowered to the bottom of the well and thereafter withdrawn slowly to the surface while an electric direct current is passed between the lower electrode and a fixed surface electrode. The potential drop created within the formation is measured at the other two moving electrodes and recorded at the surface of the ground in a specially designed and equipped recording truck. Two or more such curves usually are run with appropriate but fixed electrode separations in the well. The wide separation (third curve) measures the formation's influence upon resistivity readings much farther from the well walls than when using a narrow electrode spread; therefore, the results are less influenced by the conductivity of the well fluid within the bore hole and within the porous formations contaminated by infiltration. On the other hand, the effect of thin layers is not as readily apparent and their determination necessitates a closer spacing between the well electrodes.

When using alternating current, an *impedance log* is obtained. The setup is relatively simpler in this case, since only one well electrode is needed and one surface electrode. The application of a constant alternating potential between the two electrodes will cause a current to pass through the whole geologic section. However, the impedence of the circuit is mainly a function of the resistance to the flow of current in the neighborhood of the well and, hence, of the resistivity of rock surrounding the well bore in the immediate vicinity of the movable well electrode. The electric penetration or probing distance is now essentially constant and undisturbed by well bore fluid infiltration.

Rock resistivities are essentially a function of mineralogical composition and fluid saturation. The conductivity of current through sediments and rocks in general is predominantly electrolytic (by ionic transport of discrete electric charges carried by ionized salts in solution), rather than electronic or dielectric. Relatively pure minerals free of adsorbed water are highly resistive, such, for instance, as solid limestones or quartzites. On the other hand porous limestones and sandstones saturated with connate water are very conductive, also shales on account of their adsorbed water. Evaporites which often are almost pure crystalline substances (gypsum, anhydrite, halite) devoid of water of adsorption, are similarly highly resistive.

Hence, the logging of resistivity variations along the walls of a bore hole is indicative of its mineralogical composition provided it is not porous. When the formations are porous, misleading infor-

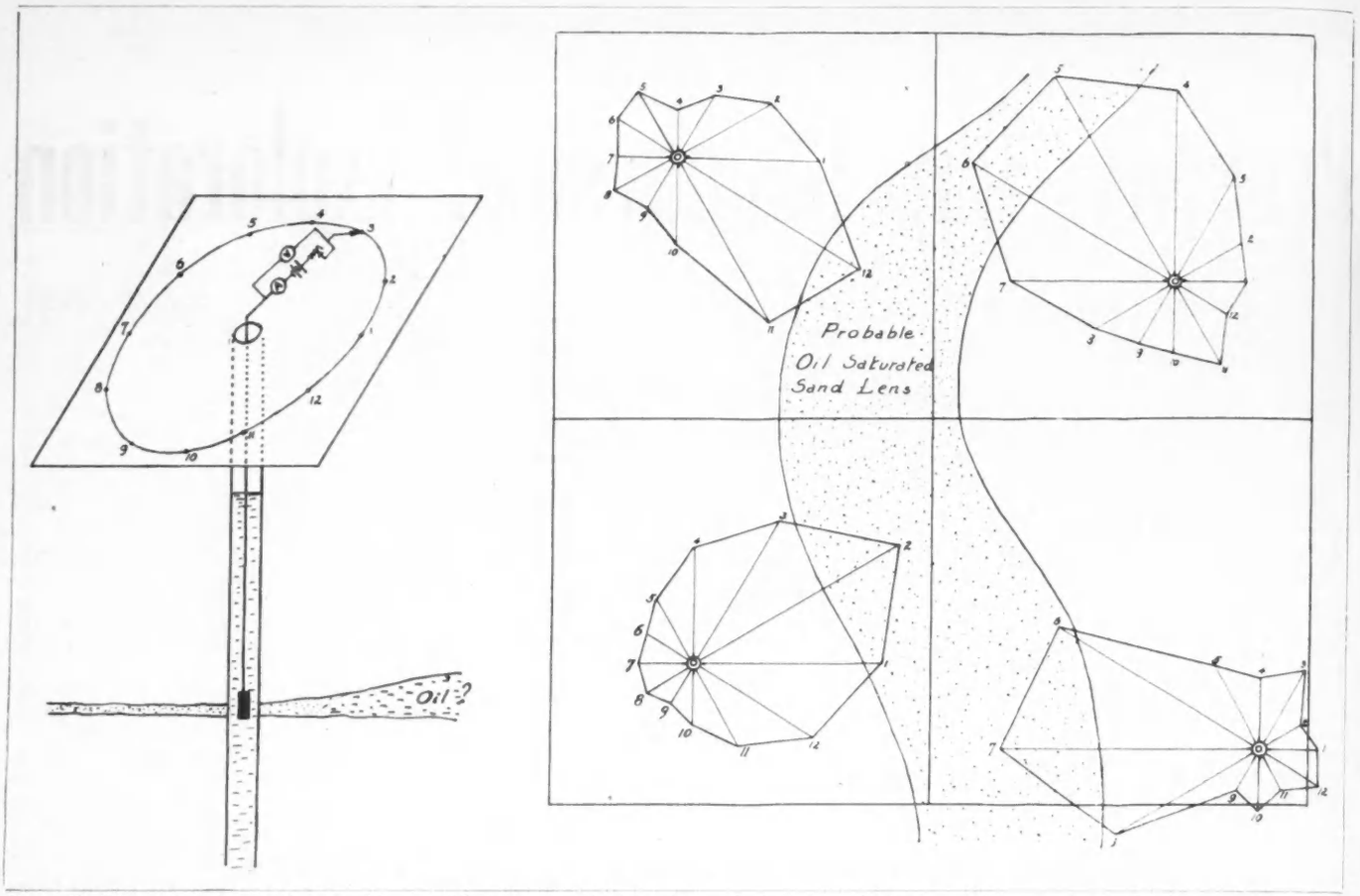


Figure 12. Schematic polar conductivity diagrams illustrating at the left, the method of lateral electric probing at the level where a stratigraphic trap is suspected. At the right, polar impedance diagrams around four wells are plotted indicating the probable occurrence of a stratigraphic oil reservoir.

mation would be indicated if it were not for the availability of the S.P. log, to be discussed later. Assuming it is known that a formation is porous, its resistivity is now controlled by its fluid content, which may be connate water, oil or gas. Experience and consideration of the resistivity profile may now give clues as to the nature of the reservoir. Indeed, many commercial oil zones have been discovered by a study of the resistivity log which had been passed up unnoticed by other means of investigation. Inasmuch as a certain gravitational segregation of the formation's fluids exists within reservoirs, it is expected that the resistivity of a porous zone will decrease from its highest value in the gas zone to an intermediate value in the oil zone and to a low value in the water zone. The thickness of the individual zones may thus be measured and by the judicious use of formulae it is even possible to estimate the oil and water saturation in the oil zone, as was proposed by Archie.[31] However, this is a problem which concerns mostly the petroleum and reservoir engineers. It might also be remarked that inasmuch as the resistivity log uses the electrical insulating property of oil for its detection, the method might also be classified as geochemical and constitutes a direct approach to oil exploration.

1b. Spontaneous Potential Logging

The spontaneous polarization or S.P. curve is a necessary complement to the resistivity log as it serves to determine whether or not a formation is porous. Indeed, the S.P. log is often misnamed the "Porosity Curve." The scientific explanation of the phenomenon measured is not very clear. Dickey[15] has offered an explanation based on measurements affected by systematic errors, and he concluded that electric potentials existed between the formation "in situ" in magnitude equal to those observed in the wells filled with fluid. The considerations discussed previously under formation contact potentials indicate that only part of the S.P. potential can be so accounted for. Mounce and Rust[14] explained it on the basis of the formation of a chain of three different electrolytes as a result of the introduction of a fluid in the well bore: drilling mud or fresh water. A verification of the experiments of these investigators similarly indicated that only part of the S.P. potential is derived from a chain of electrolytes.

A third effect, which probably explains the balance as well as the largest part of the measured S.P. potential, comes from the diffusion potential between the connate water within a porous formation and the well bore fluid. This last potential results from the difference in ionic mobility of the dissociated salts in solution within formation waters. The most common salts in solution are those of sodium, calcium and magnesium; mostly as chlorides and carbonates. Table 5 gives a list of the mobilities of ions frequently encountered in connate waters.

TABLE 5

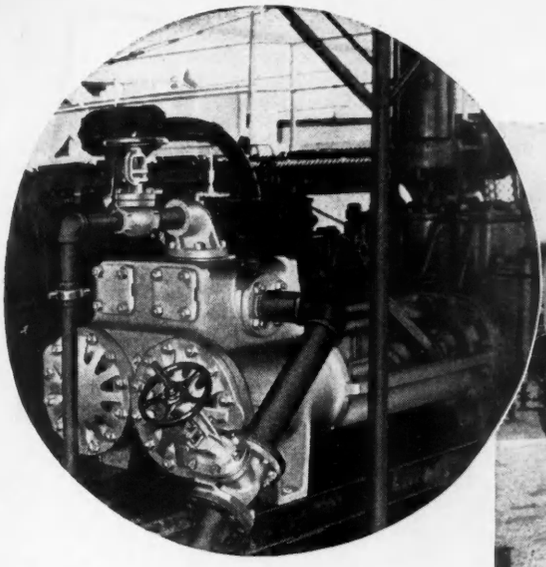
Conductivities of Ions Commonly Present in Connate Water

Anions		Cations	
Cl^-	.0006524	K^+	.0006420
I^-	.0006625	Na^+	.0004316
$\frac{1}{2}CO_3^{--}$	.000405	$\frac{1}{2}Ca^{++}$	.00051
HCO_3^-	.000078 (Cal.)	$\frac{1}{2}Mg^{++}$	.00045
$\frac{1}{2}SO_4^{--}$	.00061	$\frac{1}{2}Va^{++}$	.00055
OH^-	.001738	H^+	.003152

Source:—International Critical Tables.

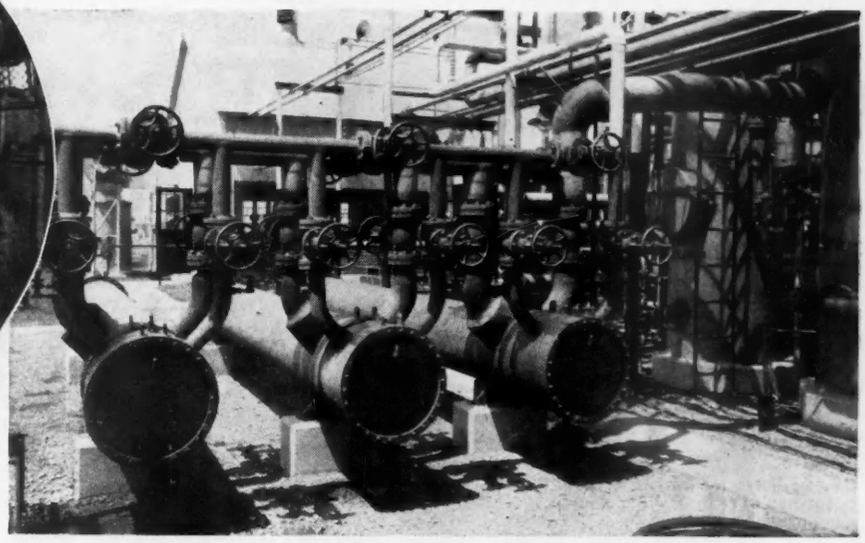
It will be realized readily that when the formation waters are in contact across the mud sheath with the relatively fresh bore hole water or alkaline drilling mud, an ionic equilibrium will be set up by diffusion, the final potential of which will depend upon the relative concentrations in the two fluids. The case where fresh water is used within the bore hole in advance of logging may be explained readily by considering that the well water will be negatively charged where it faces a salt water horizon as a result of the higher diffusion velocity of the formation anions over cations. This explains why porous connate water-bearing formations have a negative potential with respect to shales and massive limestones, dolomites and evaporites.

A fourth effect, namely the electro-filtration potential, has often been called upon to explain the S.P. curve. The fact of the matter is that it is seldom influential in wells drilled by the rotary method where an impervious mud sheath is deposited on the well walls while drilling. The electro-filtration potential exists only when liquid infiltration actually proceeds from the well bore into the porous formations or conversely, the effectiveness of the sheath prevents this by the time the well is completed and electric logs are made. It is only where cable tools are used in drilling wells that we may expect this effect to be present, for here we have no mud sheath to prevent water infiltration. The experiments of Gillingham [32] give us a measure of the magni-



SLUSH PUMPS *featuring steel piping equipment from the complete Crane line . . . valves, screwed and flanged fittings, unions, pipe.*

HEAT EXCHANGERS *in a natural gas plant equipped with Crane 4-inch steel piping materials.*



Everything for your Piping Job . . . from one complete line

ONE
SOURCE OF SUPPLY
RESPONSIBILITY
STANDARD OF QUALITY

Getting the equipment you need . . . and the quality you want . . . that's step No. 1 of any piping project. And there's where the *complete* Crane line begins to simplify every step of your job . . . from design to erection to maintenance.

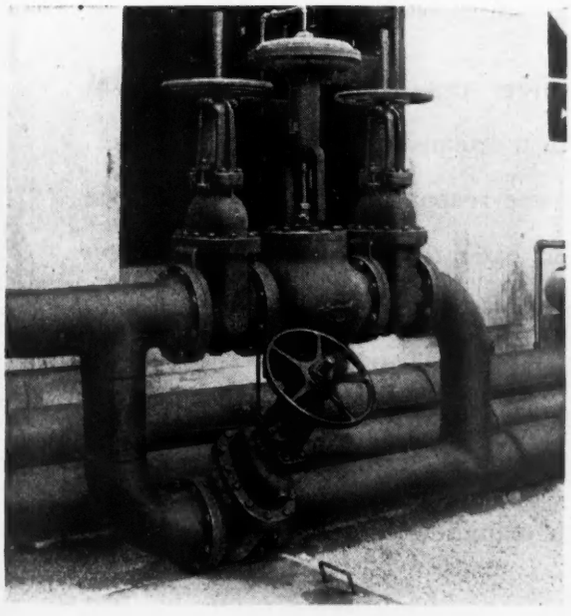
You specify everything from one line . . . valves, fittings, pipe, accessories, and fabricated piping. You get all materials on one order through your local Crane Branch or Wholesaler. A 3-way advantage assures you of the finest piping performance by standardizing on Crane equipment.

ONE SOURCE OF SUPPLY offering the world's largest selection of steel, iron, and brass piping materials for all power, process, and general service applications.

ONE RESPONSIBILITY for piping materials—helping you to get the best installation, and to avoid needless delays on jobs.

OUTSTANDING QUALITY in every item—assuring uniform dependability and durability in every part of piping systems.

CRANE CO., 836 S. Michigan Ave., Chicago 5, Illinois
Branches and Wholesalers Serving All Oil Country Areas.



CRUDE OIL FIELD LINES *showing regulator with Crane standard iron body wedge gate valves in fabricated by-pass arrangement.*

EVERYTHING FROM . . .

VALVES
FITTINGS
PIPE

CRANE

PLUMBING
AND
HEATING

FOR EVERY PIPING SYSTEM

It's an INTERNATIONAL!
A Durable Diesel Digger

● Whether it's slush pit digging, road building, or clearing a rig site—you can be sure of dependable performance from International Crawlers. They do the job in a hurry with a bare minimum of down time for maintenance.

Easy, in-built, all-weather starting gets these powerful, full-Diesel engines on the job quickly. Rugged construction gives you longer operating life. Economical operation means more profits for you. These are reasons why more and more oil field operators are standardizing on International Crawlers and International-powered equipment.

Your International Industrial Distributor will give you the facts and figures on performance-proven power.

Industrial Power Division
INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue Chicago 1, Illinois

INTERNATIONAL *POWER*

CRAWLER AND WHEEL TRACTORS • DIESEL ENGINES • POWER UNITS

tude of this effect. In the Bradford region of Pennsylvania he was able to correlate the observed electro-filtration effect with sand permeability under a variable pressure applied to the well water. As an example of the magnitude of the effect, under an applied pressure of 500 lbs./in.^{2} he observed a potential increase in the S.P. curve of 50 millivolts for a sand permeability of 15.2 millidarcies.

Failure to realize the multiple causes of the S.P. potential has led to a great deal of misgivings in the interpretation of electric logs. This is particularly true in the arkosic types of sediments in which the active clays of the matrix and cement are likely to swell when in contact with the well fluid. The electrolytic reactions are then very complex and unexpected configurations on the S.P. curve are the rule.

It may be inferred from Table 5 that major complications in evaluating S.P. curves will be encountered when connate waters are rich in carbonates or bicarbonates, which compounds have low anion mobilities. Hence a reversal of the S.P. curve becomes possible or at least a reduction in its value at the level of porous formations containing carbonaceous connate waters.

A tool which promises much in geological application is the S.P. dipmeter,[33] an apparatus designed to determine the dip of formations traversed by a bore hole, by means of the measurement of three S.P. logs taken simultaneously at the same level by means of three movable and co-planar contact points touching the walls of the wells. The orientation and dip of the contacting system of electrodes are determined by means of a photoclinometer in order to make reductions for the orientation of the instrument with respect to the magnetic north and for deviation of the hole from vertical. By a comparison and correlation of the outstanding S.P. events on the three logs and an evaluation of their respective vertical displacements, the dip angle and the dip direction are computed. The dip determinations are particularly valid for angle greater than 10°, but below this value a reliable estimate for the direction of maximum dip may yet be had. The main applications of this instrument seems to be in the development of oil and gas fields in steeply dipping formations and particularly on the edge of salt domes when the questions of the direction in which to side-track an exploratory hole, the direction in which to drill a new well, etc., are paramount. In block faulted structures, the expectancy of a fault between locations may be justified by a knowledge of formation dips.

(1c) Anisotropic Conductivity Testing

In exploration for stratigraphic traps, particularly those of the lensing type, the paramount question is that of where to locate the next test well. An exploratory well may have found an interesting show of oil at the expected sand lens level. A conductivity test in all directions around this well conducted by locating a fixed electrode at the oil show level and by moving the other electrode along a circle at the surface of the earth with the well head as center should reveal lateral sand body inhomogeneities if the well was drilled at the promiximity of an oil-bearing sand lens of importance. An increase in conductivity (a decrease in the case of low connate water saturation) should be the diagnostic indication of an oil field. In conducting this test the movable electrode should be removed horizontally from the well head by a distance equal to the depth of the fixed electrode. It is also necessary that the resistances of the surface electrodes be equalized.

If a possible sand lens reservoir may be expected at another level, anisotropic conductivity studies may be conduced by repeating the above measurements at various levels where a sand lens has definite possibilities of existence. Polar conductivity diagrams may then be drawn around the well and the process repeated at other wells in the neighborhood. Figure 12 gives a map of what may be expected for a given prospective horizon by this method of lateral probing.

It is generally conceded that one of the deterrents to the active search for stratigraphic pools of the lensing type is the enormous expense attendant on the drilling of numerous test wells. This method would at least eliminate the drilling of wells at less than two or three locations away from each other.

This is a method which could find a maximum of usefulness under conditions such as exist in the Pennsylvania fields where it is known that a well density of five dry holes per square mile does not exhaust the possibility of finding a narrow sand bar missed by all wells. This was exemplified by the accidental discovery of the Music Mountain field in 1937 under conditions considered highly improbable of success, and more recently by the opening of the Correyville field, Pennsylvania.

(2a) Gamma Ray Logging

One of the main limitations of electrical logging for subsurface geological structure mapping is its inability to log the formations in a cased bore hole. Many old wells now cased have never been or were improperly logged either geologically or electrically. In order to fill the gaps in a subsurface structure or stratigraphic map, it is often advisable to have some information on the depth and thickness of certain formations traversed by the cased bore hole. This is obtained presently by means of gamma ray logging for which the presence of a casing in the bore hole is no hindrance.

Gamma ray logging of bore holes is dependent upon the radioactivity or spontaneous disintegration of chemical elements contained in the geologic formations. Most of the radioactive elements belong to three different series, namely the uranium, the thorium, and the actinium series. Potassium is also a weak radioactive element widely distributed in geologic formations, particularly those rich in mica and in salt deposits such as potash. Except for these last instances, it is not believed that potassium contained in ordinary formations affects the radioactivity logging of bore holes.

During spontaneous disintegration, radioactive elements give off three types of rays. The alpha rays or particles (which really are helium nuclei) are expelled at moderate velocities (several thousand miles per second) insufficient to penetrate the casing of wells. They are also of insufficient energy and too small in number in sedimentary rocks to register on the measuring device.

The beta rays or high speed electrons are expelled from the radioactive material of rocks at still higher velocities than alpha particles but they are yet of too small intensity and too few in number in ordinary rocks to register on the measuring device.

The gamma rays, which are electromagnetic waves like those of light or radio, are often produced simultaneously with beta ray generation. However, while visible light is a wave of length averaging 1/50,000th of an inch, gamma rays have a wave length of 10^{-10} inch. Hence, gamma rays are very similar to x-rays but of shorter wave length and of greater power of penetration. This is fortunate in one way for the logging of wells, since the radiations can be received from far behind the walls of the wells and can penetrate the casing; on the other hand, it renders the changes at the points of contact between two different formations rather indefinite.

It has been ascertained that all rocks contain some radioactive material, although in some cases it may be present only in extremely minute amounts. Of the igneous rocks, the light colored or acidic types like granite, syenite, monzonite, etc., contain larger amount of radioactive material than the dark colored or basic types like gabbro, diorites, peridotites, etc. The sedimentary rocks, where formed at the expense of igneous rock weathering, are also radioactive, but the radioactive materials are very unequally distributed among the different types of sedimentary rocks. Pure limestones and sandstones are the least radioactive whereas the shales are the most radioactive. A large number of intermediate possibilities may be obtained, according to the proportion of shales and clays mixed with either limestone or sandstone.

The instrument used in radioactivity logging consists of an ionization chamber, or Geiger-Muller counter, containing a gas or vapor easily ionized. Since the chamber may have to be lowered in a hole full of water, it must be sufficiently strong to resist a high hydrostatic pressure and the walls must be made of heavy metal. This will prevent the passage of alpha and beta particles to the ionization chamber and only the gamma radiations will cause the gas to ionize. A system of batteries which provides the potential of the ionization chamber will let a certain current through under the influence of the gamma rays which render the gas conducting. This current is exceedingly small, 10^{-13} ampere, and it must be amplified considerably before it can be registered at the surface. The current so generated by the gamma rays is a succession of random and discrete pulses, as radioactive disintegration is not a continuous process. Therefore, the pulses must be totalized over a certain period of time at each location in order to obtain comparable readings.

By raising the ionization chamber from the bottom of the well toward the surface one obtains variations in the total gamma ray activity which will depend upon the lithology of the formations and more particularly upon the ratio of clayey minerals to radioactivity inert minerals.

Hence, the gamma ray log corresponds essentially to the resistivity curve in electrical logging which measures also, in the main, lithologic parameters. By analogy again to electric logging, the gamma ray log is of ambiguous interpretation unless some idea of fluid content in porous formations is obtainable. This is provided by neutron logging.

(2b) Neutron Logging

The neutron ($_0n^1$), a fundamental particle of matter which, with protons and and electrons, is one of the main building blocks of nature, was discovered but 15 years ago. The name implies that the particle is free of electrical charges; it is electrically neutral. Hence, it is able to penetrate through matter (made up of electrically charged particles, positive protons ($_1H^1$) and negative electron ($_1e^0$), without much interference from electrical repulsions or attractions. In particular it can be caused to penetrate several thicknesses of casing without much loss in energy. When neutron radiations strike geologic formations, certain nuclear reactions take place, the nature of which is not quite clear. Possibly two effects are present, production of artificial radioactivity, and neutron scattering.

Artificial radioactivity is the result of the transmutation of the formation's chemical and stable elements into radioactive or unstable elements. An example will illustrate the point. Suppose that a neutron strikes a sodium atom. The following nuclear reaction will take place:

$$_{11}Na^{23} + {}_0n^1 = {}_{11}Na^{24}$$

This indicates that the nucleus of sodium has captured the neutron and has now become heavy sodium which, on account of its excess mass, is now unstable and will decompose spontaneously, according to well known laws of radioactivity. The half life for this particular type of sodium is 14.8 hours, i.e., after that time only half of the radiosodium will be left. In its radioactive decay radiosodium emits gamma rays of energies 1.46, 2.0 and 3.03 million electron volts which are energetic enough to penetrate the casing and register on a Geiger-Muller counter exposed to the section irradiated by neutrons.

Neutron scattering may also occur and produce measurable pulses in the counter. The process may be explained as follows: The fast neutrons emitted by the irradiating source (a beryllium-radium mixture) are subject to deviation from their course by particles of matter particularly if the nuclei of the atoms approached are of mass very different from the neutron mass. Hence, high speed neutrons will take a curved path and may eventually strike the counter and register. On the other hand a neutron passing through matter made of nuclei of weight approximately equal to its own, i.e., a hydrogen rich substance, will be slowed down by successive collisions and will eventually be captured and create artificial radioactivity.

Accordingly, when the neutron source is in front of a porous zone containing oil and/or water, the neutrons are slowed down, eventually captured, and radio elements are created. Readings are low on the Geiger counter located a number of feet from the neutron source. When the counter passes in front of the previously irradiated porous zone it registers high as a result of the artificial radioactivity created previously by transmutation and from scattering of the high speed neutrons from the source which is now possibly in front of non-hydrogen containing formations. This relationship may be reversed if the neutron source and the gamma ray counter are in a specially close relationship with provision for the prevention of direct effect from the source upon the counter. This is the usual setup by which neutron logs are presently conducted: a high activity indicates the absence of hydrogen containing substance, a low activity their presence, hence, also the presence of porous and permeable formation.

It appears from the above that the neutron log is a fluid composition log (in much the same manner as the electric S.P. log) and more specifically a hydrogen composition log. Unfortunately, it is not possible to distinguish between oil and water in this case. Again, in view of the measurement of a property of oil in neutron logging, it could be considered as a geochemical means of detection.

3. Magnetic Logging and Polar Core Orientation

Magnetic logging of open bore holes (uncased) appeared to be of interest in view of the fact that settling of particles during sedimentation gives the geologic formations a permanent polarization which is directly related to the magnetic field of the earth at the time of sedimentation. A determination of "fossil magnetic polarization" of sediments would prove of great interest to sedimentologists, paleogeographers, and practical sub-surface geologists. It might provide the missing clue to establish that certain formations are contemporaneous. Such a development would have considerable scientific interest by providing a chronological log of the wanderings of the North Pole over geologic time, which, it is known from other sources, have been widespread. Possibly, refinements to the earth inductor can provide such measurements in the future. The method of magnetic core orientation of Lynton[34] has proved more practical in the study of structural geology. The process depends upon the availability of good cores of consolidated sediments. The magnetic polarization of the core is determined by rotating it in front of a sensitive magnetic balance, preferably astatic. A maximum deflection is obtained when the core has its axis of magnetic polarization close to the apparatus. If the core exhibits well defined bedding planes, it is possible, after correction for the nonverticality of the hole, to determine the dip and strike of the formation in place. This determination is made by assuming that the core when in the earth assumed a permanent polarization in the present earth magnetic field. This assumption does not lead to large errors for young formations (Tertiary) but may be considerably misleading in older formations.

4. Thermal Logging

The measurement of earth temperature in deep bore holes is little used as a means of structural prospecting. However, it finds an application in indicating the presence and level of escaping gases, oil and water, as manifested by a lowering of formation temperature. Petroleum engineering benefits also from these measurements by the indication of temperature rise caused by cement setting and oil reservoir temperature.

It has been suggested that the gases of microseepages responsible for geochemical prospecting might give rise to a general cooling of the formations overlying an oil and gas deposit.

Tripp[35] in particular has investigated the expected magnitude of the thermal effect using as a basis the conditions occurring over the Fort Collins structure, Colorado. Unfortunately, his conclusions are affected by numerical errors in the computations (confusing centipoise for poise and others) with the result that an enormous escape of gases is reported (376 cubic feet of methane per square yard per year at the mean temperature of 53° F). Such a high rate of escape would require at least 1000 complete replenishments of the structure over its geologic age. Even with those tremendous micromigrations, Tripp arrives at an insignificant thermal effect. The actual effect is even much less measurable. As reported earlier under the consideration of the direct approach, the thermal insulating effect of an oil and gas accumulation should have a measurable lowering of the overlying formations if this effect were present by itself. Unfortunately, there are some compensating factors. In fact, there seems to be evidences of reactions still going on at the present time within the oil field such as possibly polymerization, hydrogenation, methanization, and perhaps the synthetic electrochemical reactions suggested by the writer[36] as a possible explanation for the origin of hydrocarbons. These reactions find support in the claims made by Hayes[37] on the existence of "sheets of electric currents" around an oil reservoir where the roof of the oil field would be positive and the foot negative. The heat dissipated by the passage of these currents in the overlying formations would perhaps more than offset the heat insulating effect under ideal conditions. Yet, in a limited number of investigations, Heald[38] could find to basis for attributing any thermal effect to oil and gas, neither in typically stratigraphic traps nor in structural traps.

Conclusions

An attempt was made to present the various methods of geophysical prospecting for oil and gas in a manner different from the usual cataloging process.

The problem and objective were first stated by presenting in an earlier article[1] the classification of oil and gas reservoirs, the three main classes of which are stratigraphic, combined and structural.

Geophysical and geochemical prospecting make use of methods which require the measurements of small physical or chemical differences at the threshold of sensitivity and reproducibility of measurements. With advances in instrumentation, in fundamental discoveries and in geological interpretation techniques it is expected that the threshold of geophysically and geochemically significant measurements will recede; we will then be able to distinguish the architecture and the furniture within our poorly illuminated room, the earth, through the roof of which the methods here discussed allow us to "peek."

References

[31] G. E. Archie—"Electrical Resistivity Log as an Aid in Determining Some Reservoir Characteristics" AIME Tech. Public. 1422, Jan. 1942.

[32] W. J. Gillingham—"Electrical Logging in the Appalachian Fields" M. I. Exp. Station, Bull. No. 21, pp. 30-52, State College, Pa. 1937.

[33] H. G. Doll—"The S. P. Dipmeter" AIME Tech. Public 1547, 1943.

[34] E. D. Lynton—"Laboratory Orientation of Well Cores by Their Magnetic Polarity" AAPG Bull. 21 (5) pp. 580-615, 1937.
"Recent Developments in Laboratory Orientation of Cores by Their Magnetic Polarity." Geophysics III (2) pp. 122-129, 1938.

[35] R. M. Tripp—"Analytical and Experimental Data Concerning a Solid Hydrocarbon Survey of the Fort Collins Anticline" Geophysics IX (3) pp. 367-387, 1944.
"Micro-migration of Gaseous Hydrocarbons as Related to Geochemical Prospecting" Mines Mag. 35 (10) pp. 513-515, 1945.

[36] Sylvain J. Pirson—"Reflections on the Origin of Oil" M. I. Bull. The Penna. State College 15 (5), 1946.

[37] H. C. Hayes—"Electrical Prospecting" U. S. Patents 2,368,217 and 2,368,218.

[38] K. C. Heald—API Proc. Bull. No. 205, 1930.

Accident Prevention

IN GEOPHYSICAL EXPLORATION

By JOHN F. IMLE
Safety Supervisor, Petty Geophysical Engineering Company

THE geophysical industry is now, and has been since its inception, tagged with the unenviable designation of being inherently hazardous and, as a result, having one of the highest accident rates in the petroleum industry.

While many of the present accidents can be prevented, the geophysical industry will probably always have a high accident rate. Reasons are: (1) a dangerous material (high explosives) is necessary to the seismic branch of the industry; (2) the industry demands by its nature, that it be manned for the most part by young and inexperienced workers; (3) the operations, widely scattered, do not lend themselves to rigid control; and (4) little or no training in safety is given the worker.

Geophysical exploration had its inception about 1924. Since that time the industry has grown to the present all-time high of some 500 crews in operation in the U. S. alone. The average number of men employed on these crews is about 18, so that perhaps 8000 to 10,000 men are employed in geophysical exploration work.

Of this number, about 75 percent are engaged in the seismic method in which explosives are used, constituting the principal hazard. The remainder are engaged in relatively non-hazardous work in the gravimetric, magnetic, electrical or chemical methods of exploration. Of the 6000 to 7500 men employed in the seismic method, probably 1000 to 1500 are consistently exposed to the hazards of explosives.

Perhaps less than half the workers actively engaged in seismic exploration work are employed in the geophysical departments of major oil companies where they are exposed to some sort of organized safety program. The remainder are employed by contracting geophysical firms varying in size from one to many crews and sometimes less disposed to consider safety an important part of their program.

To say that the majors' seismic crews nominally fall under the protective wing of their general safety departments is stating the case mildly. In many instances, knowledge of the movements and operations of the geophysical crews has been most jealously guarded by the geophysical departments, because of the confidential nature of the work being done; and the safety departments, even when aware of the existence of a "doodlebug" department, were told to keep "hands off"—and this they did very effectively.

Following the lead of the majors and succumbing to their own inertia, the contractors' efforts in safety have been appallingly meager. The result has been the growth of an important branch of a major industry to a more or less mature stature without much attention having been given to safety. Also, little time and attention have been given to the keeping of accident records, so that there still exist a general state of chaos and lack of coordination of effort, exchange of information, etc., from which some gauge of the hazard ratings deserved may be deduced. Such a state of affairs discourages effective effort toward reduction of accident rates and insurance rates.

Good Record

Since the institution of full-time safety work within the company I represent and the drawing up of a set of safe practices for the guidance of the men who use explosives, there has been no fatality, no permanent total disability, and but a few permanent partial disabilities, and, most significant of all, but three injuries due to explosives accidents. During that period, millions of pounds of explosives have been handled and used on operations by many different individuals and under a wide variety of circumstances.

If nothing more constructive should result from the creation of this Geophysical Division of the Petroleum Section of the Council than a more open-minded attitude toward compilation and centralized reporting of experiences, costs, etc., that will be an enormous step forward.

The seismic industry has an almost sordid past with regard to accidents involving explosives. In the old days few, if any, regulations governed the use of explosives. Little consideration was given to such important factors as type and age of explosives. Usually no storage facilities as we know them now were provided. Transportation of explosives was by any convenient means.

The "shooter" was anyone who happened to be handy, or, more often, a man who was a misfit elsewhere. Many persons (employes and spectators alike) would be allowed to loaf around the shot point idly watching the loading and shooting operations. The inevitable result was many serious accidents involving both the public and employes.

A large factor in preventing explosives accidents is judicious selection of men for the position of shooter. We select our shooter material after the man has had a probationary period on some less dangerous operation, during which time the crew manager has the opportunity to study the individual's qualifications and characteristics. Then, if the man is willing, he is placed on the shot point operations where he works as assistant to a good shooter and under whom he receives the very best training. For six months to a year and a half, the assistant shooter is just that; the shooter trainer has sufficient opportunity to size up the man to his own satisfaction. Then if the man on probation comes up to specifications, he is allowed to take charge of the job while still under the guidance and responsibility of the old shooter.

The trial period may be brief or extended, depending upon the person and the conditions. When a new shooter takes over, he has been "through the mill," and we can be reasonably certain that he has been as well trained as possible for the job. (The above program applied in theory only during the war period and with most disastrous results.)

Our shooters are all mature men, and at the same time young enough to make good "doodlebug" material—old enough to be dependable and young enough to "take the rap." In addition to training and experience, shooter material must have other qualifications—good judgament, stability, dependability, no antipathy or nervousness toward the use of explosives, a good personality, etc. We set an arbitrary lower age limit of 21 years for the shooter and for the assistant. Minors, of course, are excluded by law.

As a further precaution against possible disaster, we have, and enforce as rigidly as possible, a rule that, under normal circumstances, no more than two men can be within a prescribed distance of the shot point while the loading and priming of the charge is being done and until after the charge has been lowered to at least 20 feet down the hole. A third person may then approach the shot hole if he has legitimate business there, but he comes under the jurisdiction of the shooter who may order him away at any time. That holds for any member of the crew, the supervisor, the safety engineer, or even the president of the company. We find that the shooters rigidly enforce this rule.

There are instances, however, where conditions require the services of more than two men at the shot point for expediency in loading and even for safety; and then the shooter, the field manager, and the party chief, having agreed on the necessity for additional exposure, advise the safety supervisor and the management to that effect. Here again the responsibility is placed squarely on the shoulders of the crew management.

Proper storage of the explosives supply is vital to safety, since under the haphazard and careless storage the material may deteriorate to a dangerous condition through age, climatic condi-

From a talk presented before the National Safety Congress, Chicago, October 8, 1946.

tions, etc. This, however, is somewhat unlikely in domestic operations where it is unncessary to purchase and store large quantities and where climatic deterioration is less severe than in some foreign operations.

Common storage of caps and explosives should never be condoned. This practice presents a very real hazard to the men who must expose themselves regularly in removing from and returning to storage the daily quota of explosives. Separate storage magazines should be provided, and these should not be located immediately adjacent to each other. They must be kept securely locked at all times. Under no conditions should explosives be allowed to remain on board the shooting truck overnight.

Well-controlled storage and adequate daily records almost entirely eliminate the possibility of careless loss of explosives which may fall into the hands of the public, and reduce the danger of pilferage by the public or saboteurs. During the war period, the Explosives Division of the Bureau of Mines controlled the purchases, storage and use of explosives. These controls, though somewhat modified, continue now in the postwar period.

For expediency, we allow the common transport of caps and explosives from the magazine to the job, and vice versa, on the shooting vehicle. The shooting vehicles are provided with separate, strong, steel containers, wood and felt lined, for dynamite and caps.

Under no circumstances is any member of the crew allowed to transport explosives from one job to another on the highway. This is a job for a specially equipped specialist—usually the explosives supplier.

Proper loading of charges calls for special training from both the safety and technical viewpoints. The shot loader must know at all times the safest method of handling the explosives, the exact location in the hole, and the condition of the charge he is loading.

The job is by no means as simple as it may seem. The explosives generally could not be dropped even if it were safe to do so. Technical requirements make it necessary that the charge be placed exactly. This calls for some kind of control over the charge even when it may be from 50 feet to several hundred feet down the hole.

This control is generally effected by means of a special jointed loading pole to the lower end of which the charge is loosely attached in such manner that the pole may be easily detached from the charge at the desired depth. All this must take place without disturbing either the electric cap lead wires, the position of the cap in the primer, or the charge itself.

Should disturbance of any of these occur, the charge may be accidentally detonated or rendered insensitive to detonation. The latter, while not necessarily in itself dangerous, will require reloading of at least a primer with the added danger of having a primed charge in the hole being reloaded.

Loading operations present definite hazards that do not exist at any other point in the program. When a sensitive detonator is placed in contact with the charge (priming) there exists a more dangerous situation. Preparation of the dynamite stick for reception of the detonator requires mechancal manipulation of the explosive and must be done with extreme caution.

Insertion of the detonator into the explosive requires exertion of some force, however slight, upon that most sensitive of explosive devices. Loading of the primed charge often requires some forcing through slight strictures in the hole. Too much force applied here will often result in accidental explosion. Only rigid training and long experience will tell the shooter how much force can safely be applied to the loading poles, and whether it should be a steady force or slight jars.

Then, when the charge has been lowered to the full length of the cap leads used (at least 60 feet recommended), the cap leads must be tied in to the shot firing line before the charge can be further lowered into position. Up to this point the cap lead shunt has remained intact, but must now be removed and the cap lead ends connected to the open ends of the shot-firing line.

The moment of making this connection is critical because of the possibility of static charge accumulations, or an otherwise energized shot line. The connection should be made (and usually can be) without any portion of the body being exposed to a possible accidental explosion. The use of cap leads as long as (or slightly longer than) the hole depth allows the tiein to be made after the charge has been placed, the loading pole withdrawn, and all personnel moved as far away as possible from the hole top.

Another hazard of loading charges is back strains. The loading poles are made as light as possible consistent with the strength required; but they are still very heavy, especially in deep hole loading. The weight of the poles, poor footing owing to water and mud, and difficult gripping make a hazardous working condition, which is the source of many accidents, and about which little can be done other than everlastingly to caution the men and teach them to lift properly.

In view of the strict requirements of the job of shooter and the accurate results expected, it appears that a high wage should be paid, to attract to the shooter's position personnel of higher intelligence and better training. There would be less turnover of shooter material and the long-term result would be safer shooter personnel.

A recent estimate revealed the average length of service of our shooters to be 2-1/3 years; the average age was 32 years. The relatively short length of service is somewhat the result of the war, but it is to a large extent probably the result of financial unattractiveness of the job.

Detonation of the loaded charge may be by means of the blasting machine or of a suitably constructed, self-contained, battery-powered blasting device which we consider both safer and more nearly foolproof. This device is generally mounted inside the shooting truck. It is locked and the key is in the possession of the shooter during the time that he and his assistant are away from the vehicle and loading the hole. This prevents any tampering with the blaster that could result in an accidental explosion.

Misfires Eliminated

The actual detonation of the shot is accomplished by a series of steps that require the use of the shooter's two hands and his "gray matter." The routine cannot become quite as mechanical as might be the case with more simple a device. We have found the device practically eliminates misfires that result from defective blasters, and the chance of a premature explosion is also greatly reduced.

A secondary result of the use of the detonator described above is the complete removal of the necessity for shooting a surface cap with each charge for the purpose of obtaining a reliable cap-break via radio. This removes one more hazard from the operations.

Another of our rigidly enforced rules prohibits the making up of more than one charge at a time. If there is but one primed charge there can never be an accidental explosion due to error in connections. It is astounding how many shooters have done this very thing. Most fatal explosions that have occurred in seismic operations have been traced to that very act. Often this is done to save time, which is never justified.

Frequently bad hole conditions require rapid reloading if reloads are to be effective; if the hole is to be reloaded at all, it must be done immediately after the previous charge has been detonated. This requires that a partially assembled charge be made up in advance and kept in readiness.

The alternative would be the drilling of another shot hole . . . often a time-consuming and expensive operation. A recent fatal explosion had the roots of its cause in trying to avoid the drilling of a new shot hole. Such practice must be completely discouraged, for sooner or later the inevitable error will bring disaster. Therefore, it is strictly prohibited in our rules to make up and prime a second charge until the first has been detonated.

Very closely related to the bad practice discussed above is the use of more than one shot line. Of course, if no more than one charge is made up, there can be no serious consequences in connecting the wrong shot line to the charge. There is no need, however, for having two shot lines in use simultaneously.

Very often it becomes necessary to load charges ahead of the actual shooting operation. Generally, this is done by a specially trained shooter's helper who is assigned to the drill crew as a driller's helper. Immediately after the hole is completed and, if necessary, cased, this man loads the charge and conceals the lead wires so that they cannot easily be detected by curious passersby, but can easily be found by the shooter when he arrives on location.

Ordinarily, the loading of "sleeper" charges is discouraged unless absolutely necessary due to bad holes. It is considered dangerous to allow charges to remain loaded overnight or longer because of possible tampering by unauthorized persons.

The loading of "sleeper" charges requires a specially equipped vehicle similar to the shooter's truck.

The destruction of unwanted or deteriorated explosives is somewhat of an art and in domestic operations should be referred to the explosives company expert. In foreign operations where the situation is likely to arise more frequently, owing to climatic conditions, etc., which accelerate the deterioration process, a trained expert should do the job.

For information regarding the destruction of explosives, see the Bureau of Mines Circular No. I.C. 7335, "Destruction of Damaged, Deteriorated or Unwanted Commercial Explosives."

A source of accidents in seismic work is locating shot points too near transmis-

sion lines so that some part of the equipment makes contact with the high-voltage line.

This is becoming an increasingly serious hazard with the advent of REA lines on almost every road along which most seismic operations are conducted. Many men have been killed and many more seriously injured by the blowing of the metallic cap leads and/or the shot line over a nearby high-tension line and grounding that line through the shooting truck when the spray from the shot blows into the air. It is not always feasible to entirely avoid highlines.

Various devices have been developed and tried to eliminate the blow and the hazard. Some of these divert the blow to one side away from the line; others attempt to blanket the blow; but none is entirely reliable. Elimination of the metallic cap lead down the shot hole by replacing the lead with an explosive fuse is probably the most effective measure. However, in the use of the explosive fuse, some hazard still exists because the column of spray may be somewhat conductive to electricity by virtue of its salt and mud content and thus allow a flashover from highline to ground. To my knowledge, this has never occurred and is a rather remote possibility. Perhaps a combination of explosive fuse and diverter or deflector would be the proper answer to this problem.

There exists, also, the hazard of accidental detonation of the cap and primed charge due to currents induced in the shot line from the nearby highline.

A similar type of hazard is the electric fence which must be avoided almost as much as the highline, not so much from the standpoint of electrocution, as from accidental contact and detonation of caps and primed charges.

Of all hazards associated with the use of explosives, those ascribed to static electricity are probably least understood. It has been found, in tests conducted by the Bureau of Mines, that it is possible for static charges to be accumulated on individuals or on ungrounded equipment, of sufficient intensity, to detonate half a dozen different kinds of explosives. On the basis of the results of these tests, it is considered necessary to take precautions to prevent accumulation of electrostatic charges on individuals who handle explosives or on equipment used at the shot point. It is particularly important to protect the detonators from contact with charged objects.

The type of explosives used is an important factor in reducing the explosive hazard in seismic work. Obviously, the least sensitive explosive presents the least hazard.

There are now on the market suitable seismograph explosives so insensitive that they cannot be exploded by anything less than the properly placed cap. However, these insensitive explosives must be detonated by means of a sensitive primer, the dangerous element, though perhaps not so much so as dynamite.

Also, there are caps available that are so insensitive that reportedly they cannot be exploded by anything less than the proper electric current. At least these are not sensitive to ordinary shock that may result from handling. The combination of these two would be a great step in the direction of complete removal of the explosives hazard.

There never will be a safe explosive. The very unpredictability of the explosives' ingredients will always constitute a hazard to users.

Other hazards attendant on seismic operations are the usual ones that plague any group of workers whose duties carry them across country and who operate under a great variety of working conditions over which little or no control can be exercised. Our safety program considers them all, but in spite of concerted efforts consistent with the very scattered nature of the work, we still have plenty of grief.

Emphasis on Education

Our main emphasis has been upon education. We feel that if a man can be educated or trained to think in terms of safety, he will act safely at all times.

A safe man recognizes the accident potentials of his surroundings and avoids them; a careless man overlooks or ignores them. Men whose work constantly exposes them to danger—the shooters, for instance—remain alive and continue on their job because they respect the hazards of their profession and operate accordingly.

They must recognize the hazard to life, limb and property at all times and govern themselves accordingly. Ignorance or disregard of the potential danger of explosion makes headlines; knowledge and respect for its danger spell safety.

Management must furnish equipment properly designed and maintained for prevention of accidental explosions. Then, all employes, not the shooter alone, must be properly trained in the use of this equipment, have knowledge of the potential dangers of their work and be able to take proper steps to prevent accidents. Failure of the "human element" in explosion prevention is generally chargeable to lack of "know-how" or lack of appreciation of the possible consequences.

We are, at present, in the midst of an experiment that promises much in the way of results. We have appointed a special safety representative on each crew to act for the safety supervisor in all matters pertaining to the safety of the men on that crew.

This man takes care of all safety matters immediately and relieves the party chief of much detail. He holds regular weekly 30-minute safety meetings, as well as longer and more general safety meetings each month, at which time the men make safety suggestions, discuss the safety rules and make recommendations for changes or additions to them. He promotes the use of safety protective equipment, looks after first-aid kits, sees that guards are provided and used, etc. This system was installed more or less as a stopgap when rapid expansion made it virtually impossible to contact the crews personally.

Some of the appointees took over with enthusiasm, and they have reduced accidents almost to the vanishing point. Others have accomplished little or nothing. It was originally hoped that some form of compensation could be worked out on the basis of accomplishment, but this has not materialized.

We supplement the efforts of the assistant safety engineer on each crew with a carefully selected series of posters, labels, slogan cards, and monthly "pep-talk" letters on timely topics which we mail from the central office.

We have issued a series of carefully designed safety lessons particularly for the use of the assistant safety engineer and the key employes. These have had very good reception and on some crews they have been made required reading for all new employes. Incidentally, on those crews accidents are almost unknown.

We also issue, monthly, a house organ with a good percentage of the contents devoted to safety topics, both general and specific. We also find the frequent personal visits to the crews to observe operations from the safety standpoint are quite a booster of crew morale as well as a lift to ourselves.

In a paper of this scope, it is virtually impossible to do more than touch on the various safety hazards of the geophysical industry and to discuss briefly the remedies thereof.

Before any very real progress in accident reduction can be made in the geophysical industry, a major change of attitude on the part of management will become necessary. The business perhaps does not lend itself well to system or to extensive planning. At least that is the excuse usually given for the generally confused order observed on many operations.

Things generally need to be done *now*, without taking time to deliberate and organize and plan for best safety and efficiency of operation. Plans are constantly in a state of flux. There are periods of relative idleness and then periods of great stress and strain in which it may be necessary to drive 24 hours at a stretch or work 48 hours without sleep or rest.

Then, also, the industry is for the most part manned by young men, scarcely any of whom have had experience in any other industry or field. They are full of drive and the urge to get things done; and, for the greater part, they overlook, neglect, or sidestep the factors affecting safety and give these lip service only.

These are the major problems which must be solved before any very material reduction of frequency rate can be effected. It is something more than a selling problem; I do not have the answer.

Definite good results can be and are being achieved in reducing the hazards in geophysical exploration. As in practically all fields of accident prevention work, the job is largely one of education, although some engineering is also necessary.

The free interchange among geophysical companies and departments of accident information, statistics, rates, and "cures" for the many hazards of exploration work will be a great stride forward in preventing accidents in this field.

Lack of system and planning and of long range foresight contributes to the high frequency rate of the geophysical exploration industry, and these factors must be overcome before real progress can be made.

There are many signs of interest among the companies in reducing accidents in the geophysical field. Insurance companies are vitally interested. Not the least interested is the Bureau of Mines which came into control of explosives during the war emergency. The labors of the Bureau of Mines explosives experts in the field of geophysics have uncovered and corrected many malpractices and doubtlessly thereby have been instrumental in saving many lives. Not a little credit is due also to the training in first aid which the Bureau of Mines has conducted for the benefit of geophysical crews.

Unsalvaged Casing Menace

IN ABANDONED STRIPPER WELLS

By F. R. COZZENS

MOST oil and gas producers are well beyond the witchcraft stage, but many will admit that peculiar things sometimes happen in the vicinty of old wells which have been pulled out and abandoned, and are supposed to be dead. Such peculiarities are common to all stripper-well territory, and those who have faced and fought gremlins of this type fervently swear that one deceased stripper is more to be feared than a dozen dry holes. Be that as it may, there actually do exist in many abandoned fields, certain destructive underground conditions which are costing the industry thousands of dollars annually.

The bag of tricks is most likely to be opened years afterward when the locality is being redrilled and the operator taps a gas pocket in some unsuspected formation. Led to believe perhaps, that a "strike" has been made, he installs gas-saving equipment, only to have the pressure fizzle out in a week or two. Generally, he drills on, finding stray showings of oil, gas, and water at various depths and in extreme cases, the pay sand will prove an enigma with all three. Sometimes the oil and water alternate, and the oil has the odor and appearance of sludge. Seeking the cause, attention is finally given to the earlier, once-productive wells. Some were not plugged. In most cases, however, the operator discovers that fairly adequate plugging was done, but that his predecessor, anxious to terminate an abandonment job as quickly as possible, sought to save time and money on the casing-pulling chore. This work was generally turned over on a percentage basis to a professional pulling crew, along with instructions to get out what pipe they could. Many of the outfits (usually portable) were under-powered and too light for tough jobs. However, by the liberal use of explosives, rippers, collar busters, etc., enough of the inner strings were salvaged to make fair wages for the crew, and pulling of the drive pipe enabled the top of the hole to be filled in to the landowner's satisfaction.

Two-Way Traffic

Anywhere from 100 to 1000 feet of pipe might have been left in the well. No one considered the fact that certain sections of this pipe held back formations which would have normally caved in and closed the bore. Nor was it suspected that a metal-encased avenue was thus provided for a destructive two-way traffic, whereby fresh water from upper stretches of the hole could reach the pay sand, and whence oil and gas existing in productive areas of the pay could be forced by the water back into the shot hole and up the bore and wasted in porous, shallow formations.

Fresh water, unless under pressure, seldom penetrates a virgin sand for any great distance, but in stripper fields where the pay has been greatly depleted of oil and gas through long continued pumping, fresh water can, and often does, penetrate dilated channels to an extent sufficient to completely encircle oil-productive areas. An uncontrolled oil-water action is thus established in the sand, and eventually, as water volume increases, barriers are formed which can not be broken down by any known recovery method.

Handling New Wells

So frequently are these and allied complications being encountered in the eastern stripper fields that operators have learned by experience to keep alert to the behavior of newly-drilled wells. When one shows peculiarities uncommon to its area, it is completed and cased, but neither shot nor pumped until a checkup is made on nearby abandonment jobs, especially those within 1000 feet. When one is discovered harboring unsalvaged casing at treacherous points, measures are undertaken to establish a closure. Substantial savings in time, labor, and money are made if this can be accomplished without removing any of the old pipe. Records of the well and data relative to its abandonment (if obtainable) aid greatly in simplifying the work.

Usual procedure is to open the old well and penetrate the bore as far as is safely possible with cleanout tools. In shallow wells (less than 1000 feet), the pay sand can sometimes be uncovered without great difficulty, since the fillings between and above the sections of casing are usually clay, rubble-rock or wall cavings. Once the pay sand is exposed, a regulation plugging job can be carried out by dropping down the opened bore a metal ball, slightly smaller in diameter than the deepest section of pipe. The ball beds itself firmly against the shoulder in the reducing joint, at or near the top of the pay. Approximately 100 pounds of cement slurry, poured down the plug, completes a permanent closure.

In fully 80 percent of old wells, however, the pay sand can not be reached with drilling tools because of obstructions. In many of these it is possible to form a bridge at some point along the bore, upon which a successful closure can be established. To prove effective, such closure must be made beneath the deepest formation likely to carry fresh water, and should be established if possible along a stretch of open hole, preferably against a firm and restricted formation.

Where well conditions justify its use, the most adaptable agent is a bridging plug, commercially made for oil field purposes in convenient diameters so it can be readily forced down the bore and expanded at the desired location. After being seated, these plugs are backed up or over burdened with cement, 100 to 150 pounds of slurry generally being used.

Adequate, open-hole bridges are frequently established by means of explosives. The practice is to use 10 to 20 pounds of extra L.F. gelatin against the face of the bore at the desired closure point. Gelatin cartridges are most convenient for the purpose, the charge being lowered to the point by insulated (waterproofed) wire, and electrically fired. Chief advantage of this method is that loosened spoil from the walls provides the bridge upon which the cement plug is poured. Wall-fractures likewise aid in supporting the plug until the cement has hardened.

Although not generally recommended, certain operators have established dependable bridges by using the drill to force waddings of wire, burlap, and other expandable materials down the bore to the desired location. All bridges, however constructed, are backed up with cement, and the majority of stripper field operators are inclined to favor the use of the 3-8-1 ratio, commonly known as gel-type cement. Its formula is three pounds bentonite and eight gallons of water to one sack of cement. The slurry of this mixture hardens faster than ordinary neat cement, and is less inclined to crack under the weight of bore-spoil. Where it becomes necessary to establish a bridge immediately below a section of casing, care must be taken to have the slurry thin enough to provide a fillup around the casing, as well as to extend into it. Otherwise, corrosion eventually will reduce the effectiveness of the plug.

When Casing Is Collapsed

By far the most difficult wells to manage are those in which sections of casing have collapsed, thus prohibiting the use of plugs yet providing sufficient openings for fluid and gas seepage. This difficulty is most commonly met where casing has been perforated or windowed so as to allow the production of two or more pays from the same well. A few operators have reported some success in fishing out upper sections of buckled pipe with a spear, or opening deeper sections with expanding tools. However, for safety reasons at least, it is generally advisable to let the pipe alone, and while it is impossible in such cases to establish a closure at any designated point in the bore, beneficial repairs can still be

made provided the operator has sufficient patience and persistence.

One method is to use an engine-driven pump and hose, to draw as much fluid as possible from the bore. A low fluid level is thus maintained for four or five consecutive days, the objective being to close the bore with cavings from the walls. A better method is to replace the fluid drawn off with a strong solution of lye and water. The procedure is to add 50 pounds of lye (sodium hydroxide) to each 100 gallons of "soft" (low lime content) water. This is forced down the hole after due precautions have been taken by the crew to avoid burns. The lye and water mixture greatly stimulates the caving process, and sludge resulting from its chemical action aids in solidifying the spoil. Another method is to pump a thin slurry of cement or finely pulverized native clay into the bore. After any type of closure is made, the upper stretches of hole are filled and tamped with clay.

Benefits of abandonment closures are noticed soon after a newly-drilled well is shot and put to pumping. Pecularities (oil, gas, and water pockets) decline, and conditions within the pay sand tend to become more stabilized. The primary objective of completing at least one new well before any repairs are made on old ones is to ascertain whether underground abnormalties actually exist in that area. A secondary objective is to provide the operator with first-hand knowledge relative to formations which were likely encountered also in old wells nearby. This enables him to place plugs and bridges and to effect abandonment closures to better advantage. As each new location is drilled, other old abandonments within its radius are checked upon, and repaired where necessary. In this manner the operator develops his territory while repairs are being made, and by the time all new locations are drilled, all treacherous abandonments likely to affect them have been closed. If artificial pressuring is contemplated, less risk is involved, and new wells can be placed closer to old ones so as to work out a more effective recovery pattern.

It has been authoritatively estimated that more than 60 percent of all abandoned wells contain some percentage of unsalvaged pipe. The big majority coming under the suspicious category were strippers, abandoned prior to 1940. Since then, strict laws and regulations have governed the plugging of wells, with special attention being given to those where it is necessary to leave casing. This estimate is not meant to imply that all previous abandonments containing casing are treacherous, but it does mean that there are hundreds of old abandonments scattered about the country which are a direct menace to the future recovery of oil and gas. Actual field practice is proving that faulty well closures are a hindrance to any type of artificial pressuring, and one such well on a given acreage (if not repaired) can prove sufficiently potent to ruin a property.

Revenue Collections Up

Revenues from the three federal oil taxes in the first two months, 1947 were more than $15 million above collections for the corresponding period in 1946, the Internal Revenue Bureau has disclosed. Collections from pipe line transportation reached a new all-time high in February at more than $2 million.

NEW DRILLING CONTRACT

Report Form

By ANTHONY GIBBON
Staff Writer

A SO-CALLED Contract Report designed to collect all pertinent information about a drilling contract at the time of the initial negotiations between the operator and the representative of the drilling contractor, has been designed by Barnes Drilling Company, Tulsa, and has proved a time- and money-saver. The form was designed by Wendell B. Barnes, president of the firm, which specializes in workover jobs. Barnes, an attorney, in explaining his reasons for preparing the form, which is the first of its kind to be used in the area, pointed out that there are a number of small but important details which are generally overlooked when the broader terms of a contract are being discussed by the principals.

Barnes pointed out that every drilling contractor is faced with the problem of keeping his office as completely informed of operations as is the field man. This covers information relating to a new contract which frequently is negotiated in the field. When general contract terms are discussed and after agreement has been reached, there usually is an interval before papers are actually drawn up, signed and distributed, when pertinent information is scattered among parties to the negotiations. Then there ususally is some information that does not find its way into the formal contract which the office, the engineer, or the accountant must have. Points frequently overlooked include such matters as the name of the supervisor for the operator; how the contractor, tool pusher or driller can get into touch with him quickly; how the crew can get to the location, etc.

The new form is designed to collect all such information and is designed to establish a businesslike approach to final consummation of the contract. Its use by Barnes Drilling Company has resulted in the saving of much time and telephone calls for both contractor and operator.

The form is not intended to replace the contract itself, but it does simplify the work of the office in preparing the final contract. Furthermore, by including other information called for relating to type of equipment to be used on the job, a good and permanent record of the contract is readily available, through distribution of duplicates, to all personnel connected with the work.

The Contract Report reproduced herewith is designed primarily for use by cable tool contractors, but with some slight modifications can be readily adapted for use by rotary contractors. The form is not copyrighted and its use is recommended to all contractors who may be interested in its application.

Contract Report

Operator _____ Office Address _____ Phone _____

Work ordered by _____ Address _____ Phone _____

Work to be Supervised by _____ Address _____ Phone _____

Work to be started _____ 1946 Type of work to be performed _____

Contract to be prepared by _____ Contract to be mailed to _____

Lease _____ Well No. _____ Location: Sec. _____ T _____ R _____

County _____ State _____ Near City _____

Total Depth _____ Present Depth _____ Size Hole _____

Casing: Size _____ Weight _____ Thread _____ Set at _____

Tubing: Size _____ Weight _____ Thread _____

Control Head: _____ Type _____ Series ( ) 600 ( ) 900

Fuel available _____
Distance and Directions

Derrick: ( ) Yes ( ) No

Directions to Well:

Unit Assigned _____ Rate _____ Driller 1 _____

Mast Assigned _____ Rate _____ Driller 2 _____

Date moved in _____ Driller 3 _____

By _____ Truck Company Amount charged $ _____

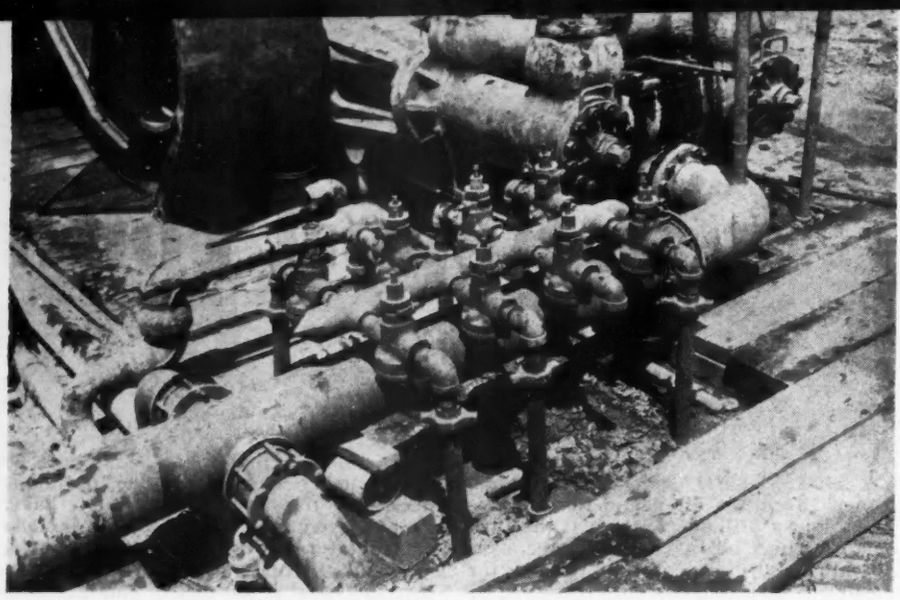
Work Started _____ Work Completed _____ Days Charged _____

Date moved out _____ By _____ Truck Company Amount $ _____

REMARKS:

Date _____ Reported by _____

(Courtesy Barnes Drilling Company, Tulsa)



Convenient Manifold Supplies Eight Auxiliary Mud Lines

By GILBERT M. WILSON, Staff Writer

A PROBLEM that arises at each new location and one that usually takes a considerable time during rigging-up operations, is in hooking up the numerous small high-pressure mud lines that deliver mud from the discharge side of the pumps over to the several tanks, mud guns, sumps, etc. In the majority of instances, such lines are taken off from whatever part of the mud line system that might be located conveniently near by. The resulting hook-ups frequently are an unsightly and confusing criss-crossing of lines extending over a wide area. Should varying topograph require different setups at each new location, the problem reoccurs as to which line should be cut and where new fitting should be welded into them, resulting in further loss of rigging-up time and expensive welding.

This type of problem is made simpler with the compact manifold installation designed by one large drilling contractor. It consists of an eight-outlet manifold mounted near one of the mud pumps into which nearly all auxiliary mud lines required on the rig may be connected. The unit is conveniently situated near one of the mud pumps and preferably near a roadway or yard area into which trucks may be driven. The assembly, aligned and prefabricated in the shops, may be installed at any convenient point at the rig site, the installation shown being mounted atop the ten-inch suction line of one of the mud pumps. The manifold is a four-foot length of 4½-inch drill pipe closed off at each end and mounted atop two short pipe legs which in turn are welded to the upper surface of the suction line. Branching out laterally from the manifold are eight 20-inch nipples and connecting plug-type valves. Hammer-type unions and nipples several feet long take the small lines down to ground level where the lines are then directed toward the several rig installations.

Two of the header fittings are feeders, a line coming in from each of the two mud pumps. A third outlet delivers mud to the several mixing guns positioned along the side of the unitized circulating tank, while a fourth runs over to the small mixing tank where special muds or solutions are prepared. The fifth connection supplies the fillup line, delivering mud to the rig floor where it is used in filling the hole with mud as drill pipe is withdrawn. A sixth line runs over to the reserve mud tank, and the seventh to a waste line leading to the waste water sump. The eighth outlet is a spare which may be used in a number of different ways, chief of which is its emergency use should one of the other lines cut out or temporarily be placed out of service. One good use to which the spare outlet may be put is that of shipping out liquid mud, which frequently is done when good, uncontaminated mud may be salvaged and trucked out for use on another well. It is for the latter purpose that it is desirable to have the manifold centrally located near a roadway so that only a few minutes will be required to connect up a filling hose, instead of having to resort to the makeshift method of rigging up a temporary connecting system.

The manifold installation presents no problem during moving operations. The small manifold and valves are allowed to remain attached to the suction line, so that when the latter is disconnected the assembly may be handled as a single unit. Cost of building the compact unit is slight when compared with the savings resulting from decreased rigging-up time, ease of manipulation when in operation, and decreased waste of pipe and fittings due to the fact that few cuts or welds are needed in assembling the mud line system.

Tennessee Gas Officers and Board of Directors Renamed

The board of directors of Tennessee Gas and Transmission Company was re-elected at the annual meeting of stockholders.

The company's board is composed of Hervey M. Amsler, vice president of Richrock Royalty Company, Houston; Robert K. Hanger of Cantey, Hanger, McMahon, McKnight & Johnson, Fort Worth; Ardon B. Judd, vice president and general manager of Republic Supply Company, Houston; Eugene McElvaney, vice president of First National Bank in Dallas; W. E. Mueller, vice president of Tennessee Gas and Transmission Company, Houston; Roy S. Nelson, president of Gulf States Utilities Company, Beaumont; Gardiner Symonds, president of Tennessee Gas and Transmission Company, Houston.

At the annual organization meeting of directors following the stockholders' meeting, all officers were reelected.

Charles B. Gannaway Named Tulsa Engineers President

Charles B. Gannaway, Jr., professional engineer and plant manager of the Tulsa Boiler & Machinery Company, was elected president of the Engineers Club of Tulsa. Other officers elected were Ernest M. Newland, Oklahoma Steel Castings Company, executive vice president; Dean E. Foster, Bethlehem Supply Company, secretary; J. Murray Walker, Lane-Wells Company, treasurer; Robert G. Smith, General Electric Company; Lloyd E. Elkins, Stanolind Oil & Gas Company; Raymond M. Carr, Sinclair Prairie Oil Company; and W. J. Myers, Jr., Public Service Company, all vice presidents.

F. W. Robson of The Happy Company was named director, along with T. D. Williamson, Jr., of the firm of T. D. Williamson, Inc., and H. M. Cooley, Bethlehem Steel Company. Officers will be installed May 14.

Bramstedt With Caltex

William Frederick Bramstedt has been elected vice president in charge of crude oil sales for California Texas Oil Company, Ltd., and assumed his new duties at once. He has been connected with the engineering, refining and crude oil divisions of the oil industry for 20 years, most of which time he has been associated with Standard Oil Company of California, which company is a co-owner with The Texas Company of the Caltex organization.

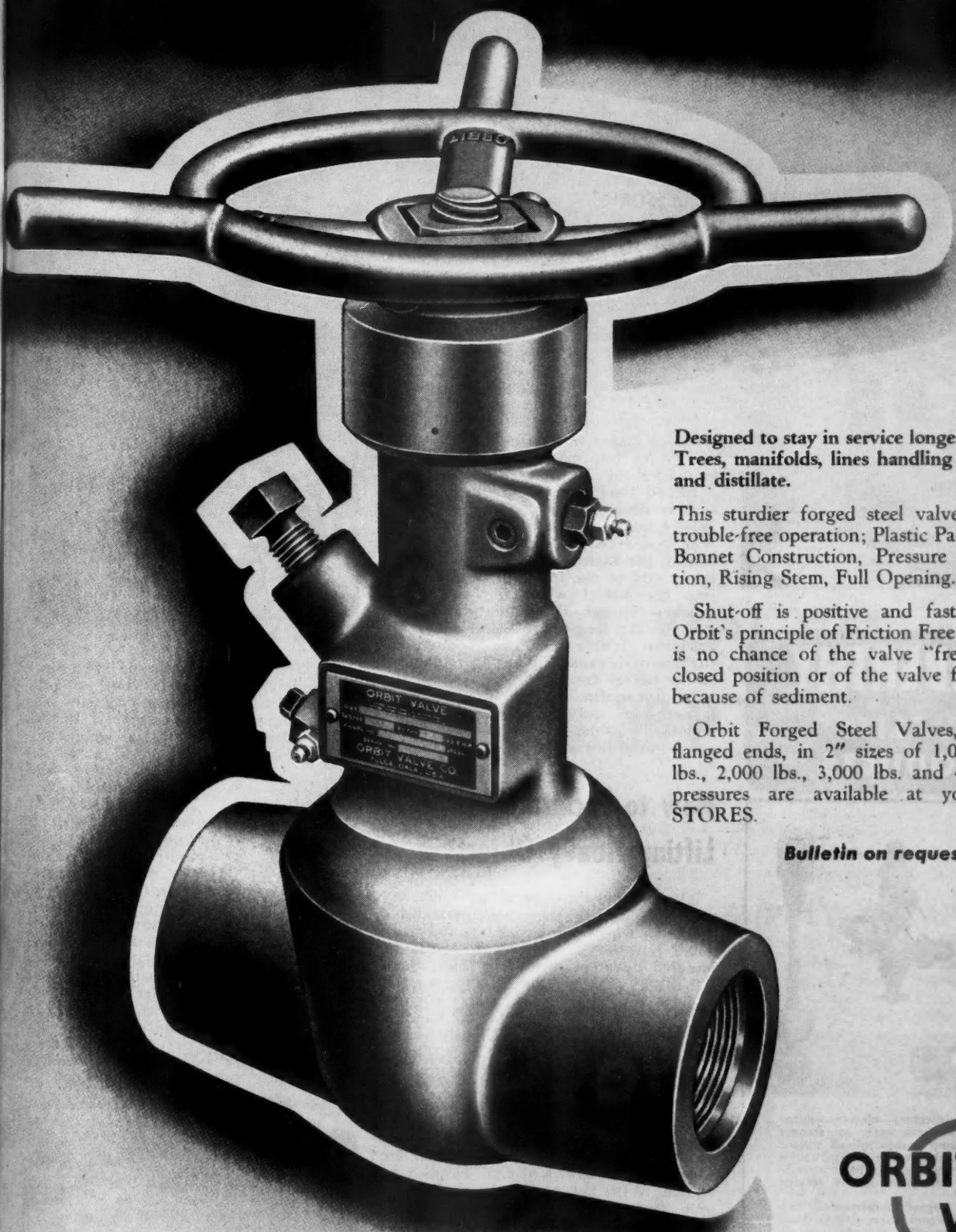
Late in 1946 he joined Arabian American Oil Company as technical representative on crude oil sales.

Bramstedt joined the Standard of California in 1927, immediately after taking his degree in Mechanical Engineering from the University of California. During 1943-1945 he had been vice president and director and project manager in the field for Standard Oil Company of Alaska as contractor to the United States War Department in the operation and maintenance of the Canol refinery and pipe line system.

Indian Lands Offered

Sealed bids for oil and gas leases on restricted allotted Indian lands will be opened at the Kiowa Indian Agency at Anadarko, Okla., April 10 at 10 a.m.

Now a 4,000 Pound Test
FORGED STEEL VALVE



Designed to stay in service longer on Christmas Trees, manifolds, lines handling oil, water, gas and distillate.

This sturdier forged steel valve features, for trouble-free operation; Plastic Packing, Welded Bonnet Construction, Pressure Free Lubrication, Rising Stem, Full Opening.

Shut-off is positive and fast, and due to Orbit's principle of Friction Free Seating, there is no chance of the valve "freezing" in the closed position or of the valve failing to close because of sediment.

Orbit Forged Steel Valves, screwed or flanged ends, in 2" sizes of 1,000 lbs., 1,500 lbs., 2,000 lbs., 3,000 lbs. and 4,000 lbs. test pressures are available at your SUPPLY STORES.

Bulletin on request

ORBIT VALVES

ORBIT VALVE COMPANY

Export Representative: Jones & Laughlin Supply Co., 230 Park Ave., New York 17, N. Y.

TULSA 1, OKLAHOMA

Eliminate Fluid Pick-Up When Dumping Cement

Among the problems frequently encountered by cable tool drillers is that of using a bailer to dump cement slurry or water at the bottom of the hole when the well already may be partially filled with other fluids. There is no problem in getting the bailer to bottom, nor in dumping it there, but on the pick-up, the dart falls free, closing the flapper, causing the bailer to pick up a portion of fluid just dumped. Many drillers merely use a stick several feet long which is lashed to the dart in such a way that when the lower end of the stick hits bottom, it will not only open the flapper valve, but will jam up into the barrel beside the flapper valve, causing the valve to remain open during the trip out of the hole.

BAILER ACCESSORIES

To eliminate this necessity of making temporary lash-ups each time a dump is made, one Montana driller employs a forked steel bar, resembling a tuning fork in design, which is attached to the side of the dart with a clamp and single bolt. As is readily apparent on inspection of the assembled device shown, the upper end of the tool will be forced up into the barrel when the small foot touches bottom. By regulating the degree of tightness of the nut and bolt, sufficient friction can be created on the clamp to cause the bar to remain up in the barrel during the trip out of the hole. For normal bailing operations, it is necessary only to unbolt the device and lay it aside, after which the bailer can be used in the normal manner.

PENBERTHY
QUALITY
PRODUCTS

Penberthy injectors—ejectors—automatic electric and water (or steam) operated sump pumps are all widely used throughout the oil industry because they have always been dependable under the most severe service conditions.
All are of rugged construction and made by an organization with 59 years experience in the manufacture of highest quality products.

PENBERTHY INJECTOR CO.
DETROIT 2, MICH. Canadian Plant WINDSOR, ONTARIO

How to Facilitate Lifting Heavy Objects

Throughout the typical working day on the drilling rig there are innumerable instances where subs, rock bits and other small but heavy equipment must be handled by men on the rig floor. Such equipment generally is too heavy for one man, but is handled with difficulty by two or more men, due to its small size. To simplify this recurring problem, one drilling company makes a small lifting board consisting of a three-foot length of 2x12, and to each end of which are attached short wooden handles as shown. With the assistance of this device, two or more men, easily and quickly, can transport heavy fittings around the derrick floor area.

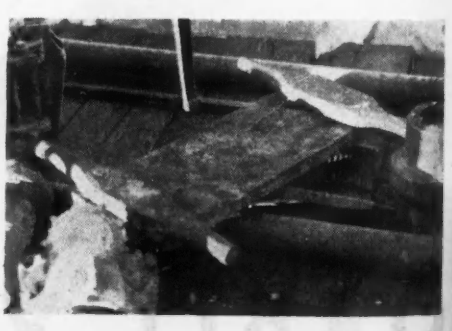
LIFTING DEVICES

Another type used by a major company consists of a shallow pan, made either of light steel, hardware cloth, or of wood, but which is underslung slightly for greater ease and safety in handling rounded objects such as rock bits.

Inspect Boilers Safely

Inspection and cleaning of boiler flues is simplified and made a safer job with the aid of a light platform-type step ladder employed by one company. It consists of sucker rod material welded together to form the ladder portion, with the platform portion being made of several short pieces of 1x6-inch material bolted across the upper end as shown. The unit is leaned against the end of the boiler, and when positioned properly, provides just the right amount of clearance for a man to work comfortably and still leave a convenient platform in front of him on which he can lay tools. The unit is kept at the boiler site for this single purpose, and having it handy at all times, eliminates necessity for having to rig up boxes on makeshift ladders for the routine inspection or cleaning jobs.

BOILER INSPECTION



WATER FLOODING calls for Continuous Operation . . .

This battery of 16 "Oilwell" No. 36-P Triplex Plunger Pumps has been in continuous operation near Bradford, Pennsylvania, *without any mechanical trouble* ever since installations were completed early in 1945. They are running at 100 R.P.M., 50-lb. intake pressure and 500-lb. discharge pressure in water-flooding service.

—AND THAT'S WHAT YOU GET WITH "Oilwell" No. 36-P Triplex Pumps

THESE are the heavy-duty, horizontal, single-acting, triplex plunger pumps which "Oilwell" engineers created specifically for water-flooding operations. Since their introduction in 1944, operators everywhere are acclaiming them as unsurpassed within their performance range for the maintenance of high pressures with minimum pulsations in the input line.

The "Oilwell" No. 36-P Triplex Pump is designed for efficient operation over a range of 40 to 75 horsepower. This permits using prime movers that are most readily available. Dependable performance at various operating speeds assures a selection of volume and pressure to meet the needs of both small and large producers.

Horizontal construction permits oilbath as well as pressure lubrication, assuring long life of moving parts and continuous service.

Engineering data, bulletins and prices may be obtained from your local "Oilwell" store. Plants now in service may be observed upon request.

OIL WELL SUPPLY COMPANY

Branches Serving All Oil Fields

Executive Office—Dallas, Texas
Export Division Office—
30 Rockefeller Plaza
New York 20, N. Y.

Division Offices—Columbus, Ohio
Dallas, Texas . . . Denver, Colorado
Houston, Texas . . . Tulsa, Oklahoma
Los Angeles, California

UNITED STATES STEEL

OIL WELL SUPPLY COMPANY · USS · OILWELL · UNITED STATES STEEL

"OILWELL"

Simplex
UTIL-A-TOOL

CUTS COSTS

—on Pulling, Pushing, Spreading, Bending, Clamping, Holding and Lifting Jobs

• There's hardly a spot in any busy plant or in the field where you won't find many uses for a "Util-A-Tool" Set—on production installation, maintenance and repair operations.

Here are a few of the many jobs a Simplex "Util-A-Tool" handles with cost-cutting speed and efficiency: (1) Clamping and holding parts for welding or assembly, (2) Pulling pinions, bushings, wheels, and gears, (3) Lifting or lowering heavy machinery for installation, leveling or maintenance, (4) Serving as a handy beam clamp for chain hoists with the use of sky hooks.

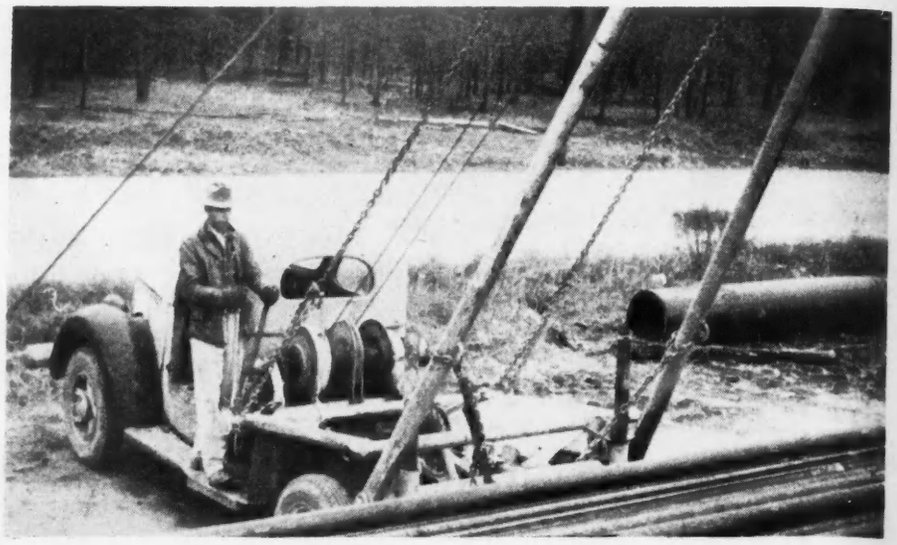
Time and labor savings on a single job often save more than the full cost of a "Util-A-Tool" Set. Now available for immediate delivery through distributors everywhere. Write for Bulletin P & P-46.

"THE TOOL OF A THOUSAND USES"

TEMPLETON, KENLY & CO.
1032 South Central Ave., Chicago 44, Ill.

DRILLING HINTS

Handle Pipe Easily With Rebuilt Truck



One contractor who does his own pipe hauling rigged up a worn-out winch truck for the sole purpose of unloading pipe from box cars. It was found that although this equipment was only used periodically, it was well worth the space necessary to store it in order to have specific equipment for the job. Having a hoisting speed of twice the speed of an ordinary winch truck, it was found that it could speed the time necessary to load a truck, besides saving the wear and tear on a regular winch made for heavy loads and slow speeds.

LOADING DEVICES

After removing the bed from the truck which had served its useful life as a means of hauling, and welding up a square frame of four-inch drill pipe, a support for the winch base was thus formed. A two-inch bar was run through a piece of drill pipe and also through the eyes of the lower end of the A-frame. Chains were fastened to the front of the four-inch frames and to the A-frame to support it at the proper angle. In the over-the-road position, the chains were slacked to allow the top of the frame to pass under wires above the highway.

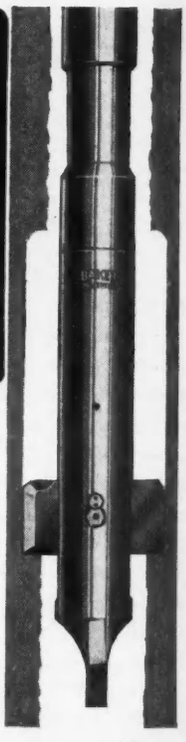
The winch was remodeled by decreasing the gear ratio by a half so as to increase the speed. The drum was also split in the middle to permit two lines to spool at once, with each bitter end hooked in each end of the pipe being handled. The winch was also equipped with a clutch and a brake so that it could be manned outside the truck.

The top of the A-frame was equipped with a large pin and sheet of boiler plate with two eyes to receive the hooks from two blocks for each of the two lines running to the ends of the pipe. This eliminated the heavy strain placed on the wire line when only one line is used, and also made the pipe much more manageable.

With this equipment, it is only necessary to send out the trucks required to haul the pipe and two extra men to handle the pipe.

$5.00 is paid for each illustrated acceptable contribution. Mail to The Editor, THE OIL WEEKLY, P. O. Box 2608, Houston 1, Texas

IF YOU WANT TO KEEP OUT OF *Scrapes*

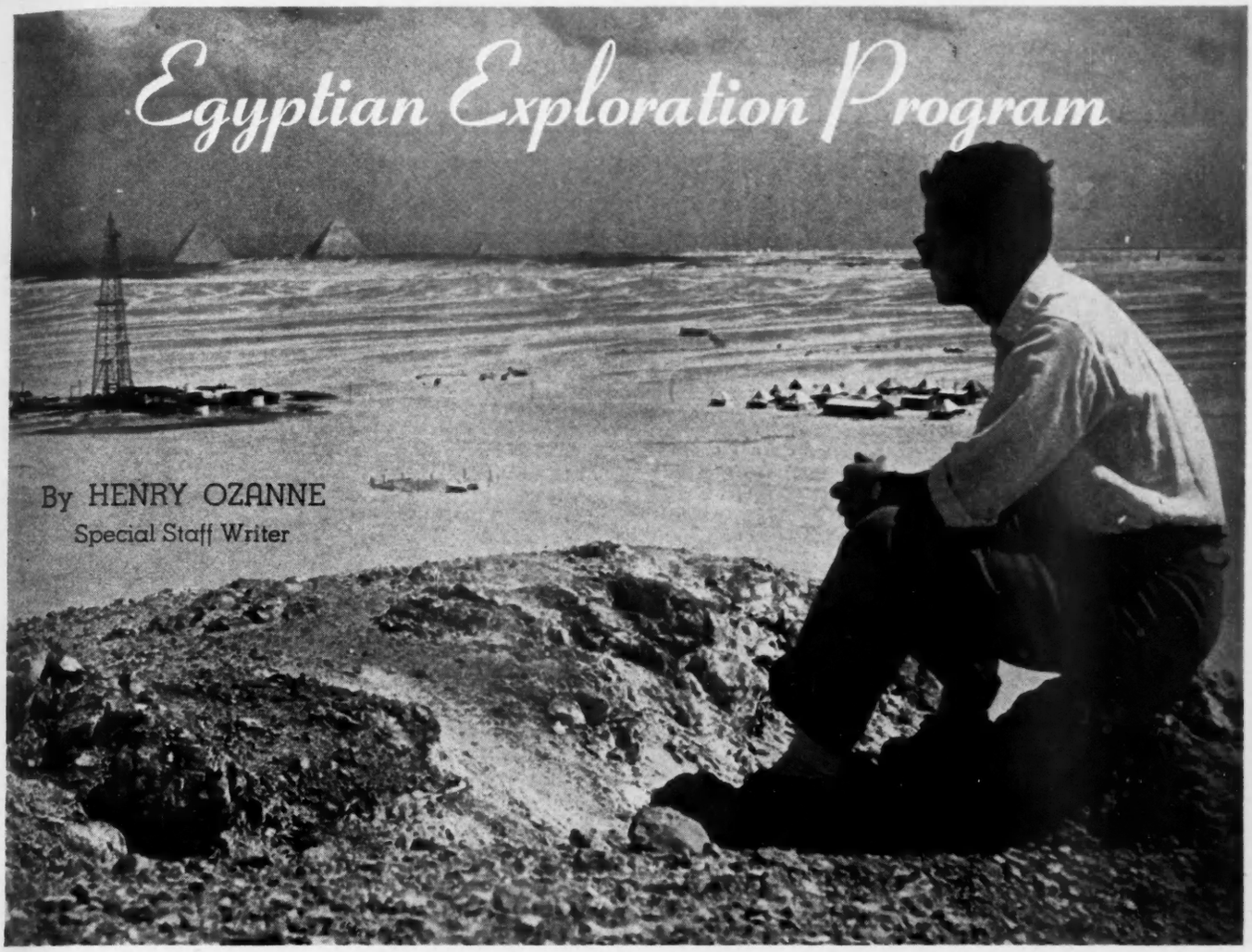


...get a BAKER WALL SCRAPER on the job! It will enlarge the hole, or just scrape off the "cake" whichever you want. Blades open positively — do their stuff — and then close to come safely out of the hole. It's easy to run.

BAKER *Rotary* WALL SCRAPER

ASK THE BAKER MAN

Egyptian Exploration Program



By HENRY OZANNE
Special Staff Writer

Part 2

(Of a two-part discussion)

IN the first article of this series on Egypt's oil (THE OIL WEEKLY March 3, 1947) there were presented a history of the industry's operations in Egypt, the present petroleum policy of the Egyptian government, and an account of the post-war operations of Anglo-Egyptian Oilfields, Ltd., a member of the Royal Dutch-Shell group, as yet the only company which has discovered oil in Egypt. The current article will review the recent activities of the two American companies now drilling in Egypt, Standard Oil Company of Egypt and Socony-Vacuum Oil Company. Since Socony-Vacuum is jointly associated now with Anglo-Egyptian in all exploitation in the Sinai Peninsula south of the 31st parallel, it will be considered first.

2. SOCONY-VACUUM'S OPERATIONS

First actual field work in Egypt for Socony-Vacuum Oil Company was done in 1935 and 1936 by Dr. E. Jablonski who was accompanied at times by R. V. Anderson and Dr. George Brinckmeier. Following their investigations, a program of exploration was begun under the direction of Anderson and centering in the vicinity of Hurghada. Dr. A. E. Fath took over the direction of the geological and geophysical department in 1937 and the staff thereafter was built up to six geologists, two paleontologists and a geophysicist by 1939. While field work was mainly concentrated in the Gulf of Suez and Red Sea regions, exploration of the Cairo-Suez region and of North Sinai also was carried out. Howard Quinlan replaced Anderson as manager in 1938.

In 1937, geophysical work was started and between November, 1937, and May, 1938, torsion balance and gravity meter surveys were conducted between Quseir and Abu Shaar, north of Hurghada. A seismograph crew began work in 1938 and by September of that year had carried out surveys on the more important prospects on the west coast of the Red Sea and also near El Arish in North Sinai. A gravity meter crew, shortly followed by a second, began operations in North Sinai in late 1938, widening their activities until considerable areas in North Sinai, the Cairo-Suez region, the Gulf of Suez district, the Red Sea coast, and in the Western Desert west of Fayium had been completed by 1941.

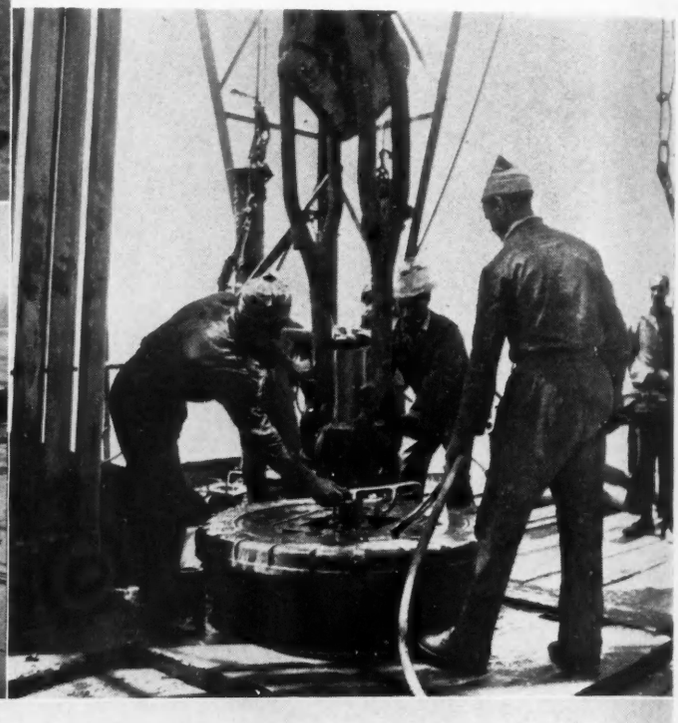
At top of page—Akell Samy, eff., assistant to Standard Oil Company of Egypt's manager of personnel, gazing over Abu Roash 2 to the Pyramids beyond.

Drilling operations began at Dishet el Dhaba on Feb. 5, 1938, and by July a dry hole was completed to 1995 feet. In December, 1938, a second well was spudded in on a prospect on Giftun Saghir Island, and by April, 1941, a total of 12 wells had been drilled in the Gulf of Suez-Red Sea region at Sherm el Arab, Abu Shaar, Wadi Dara, Dishet el Dhaba, Mareikha and Ras Shukheir. All these wells were dry, but a majority of them had encouraging shows of oil.

In 1941, due to the approach of the theater of war toward Egypt, operations were suspended and the Egyptian government granted a moratorium on drilling obligations. This respite lasted until April, 1945, at which time exploration was resumed.

A. T. Schwennesen, in charge of geological work, arrived in March, 1945, and by the end of 1946 the staff included two geophysicists and four geologists and paleontologists besides Egyptian assistant geologists and instrument men. Most of the recent geological work has been done in the Cairo-Suez district.

Meanwhile arrangements were con-



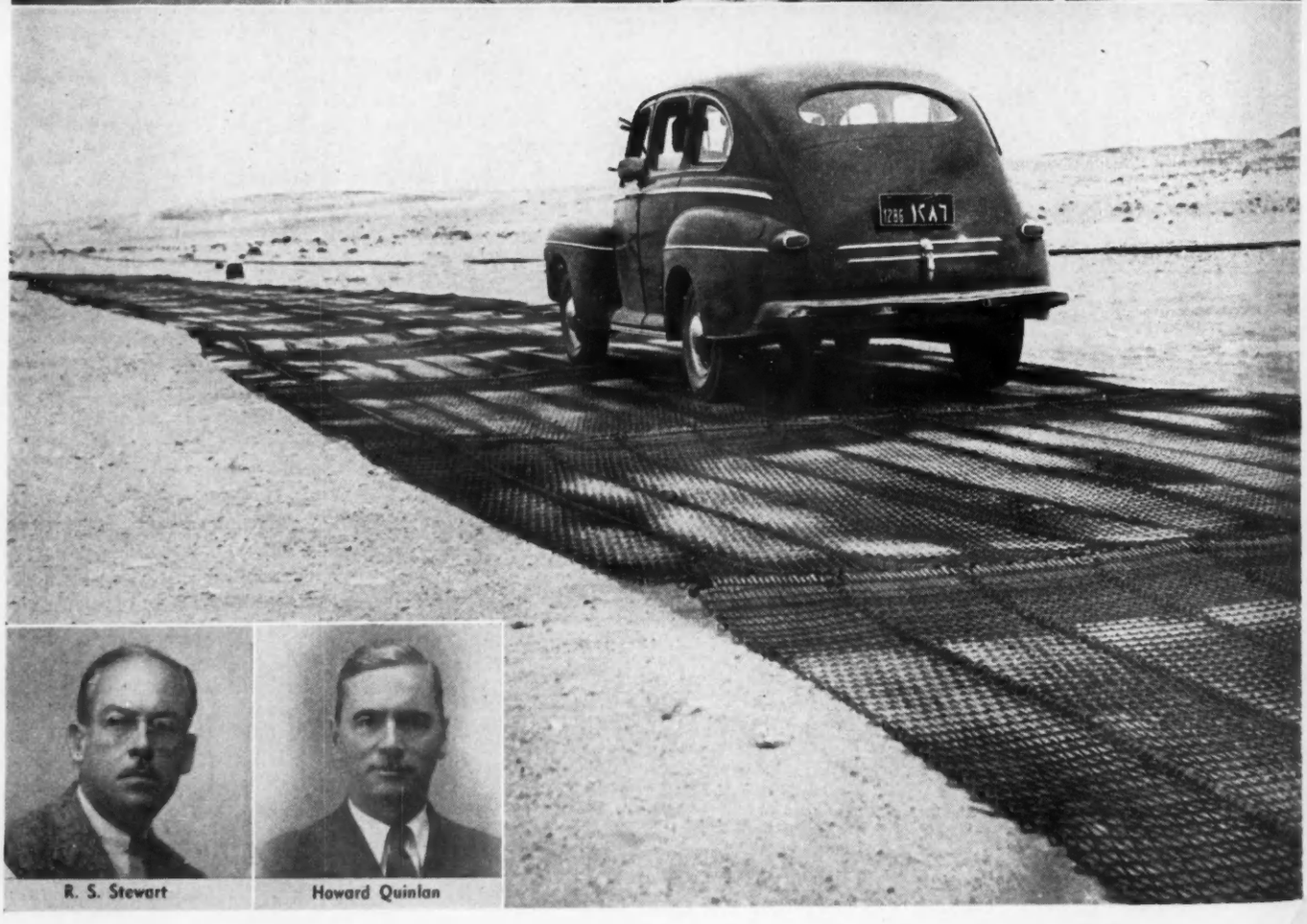
Top left: Socony-Vacuum's seismograph camp in the Red Sea area.

Left center: A well being drilled in the sea; also a pumper.

Right center: Pulling out the drill pipe in Egyptian well.

Lower: Airplane matting provides a road across Egypt's Western Desert to Standard's Abu Roash 2.

Insets: R. S. Stewart, Socony-Vacuum's Middle East manager, Cairo; and Howard Quinlin, production chief for Socony-Vacuum in Egypt.



R. S. Stewart

Howard Quinlan

cluded with Anglo-Egyptian Oilfields (Shell) to pool certain holdings in Sinai as some prospects in that region were divided between the two companies. The Ayun Musa fold was selected first for a test with a well started in December, 1944. Both this and a second were dry.

Asl 1 in Western Sinai was spudded in December, 1944, drilled to more than 4000 feet and then suspended due to loss of circulation. However, Sudr 1, also on pooled territory, had been drilled and was tested as a producing well in April, 1946. Exploration on this joint acreage is proceeding with a second well at Ras Sudr and with a wildcat started September, 1946, on the Nebwi fold. Plans are drawn to drill the Geham prospect in North Sinai and Gebel Hamra east of Suez.

Drilling on Socony-Vacuum's own holdings began with Dishet el Dhaba 5 in February, 1946, and a well at Ras Bakr, both dry.

Geophysical surveys were commenced in the second half of 1946. A seismic reflection party is at work on the Ras Bakr area, Gulf of Suez, and will proceed shortly to other nearby prospects. At the same time experimental seismic reflection and refraction surveys are being carried out in Sinai in conjunction with Anglo-Egyptian Oilfields and Standard Oil Company of Egypt.

Future plans include reconnaissance geological work in the Western Desert and detailing of some areas in the Gulf of Suez. The geophysical party will continue shooting prospects indicated by previous geological and gravity meter surveys in the Gulf of Suez region.

WELLS DRILLED BY SOCONY-VACUUM OIL COMPANY IN EGYPT

WELLS	Depth (Ft.)	Started	Completed
Dishet el Dhaba 2	1995	Feb. 2, 1938	July 9, 1938
Giftun Saghir 1	3103	Dec. 2, 1938	May 28, 1939
Sherm el Arab 1	1892	May 23, 1939	June 23, 1939
Abu Shaar West 1	2866	July 9, 1939	Sept. 13, 1939
Wadi Dara 1	6722	July 21, 1939	April 1, 1940
Abu Shaar South 1	2833	Sept. 26, 1939	Nov. 4, 1939
Dishet el Dhaba 3	3800	Nov. 21, 1939	Feb. 26, 1940
Mareikha 1	3025	March 12, 1940	June 3, 1940
Shukheir 1	3545	May 2, 1940	Sept. 19, 1940
Dishet el Dhaba 4	3756	Oct. 1, 1940	Nov. 19, 1940
Shukheir 2	4823	Dec. 10, 1940	Feb. 9, 1941
Shukheir 3	4900	March 6, 1941	April 16, 1941
Dishet el Dhaba 5	3216	March 2, 1946	May 24, 1946
Ras Bakr 1	6784	July 5, 1946	Nov. 5, 1946

Joint Account with Anglo-Egyptian Oilfields, Ltd.

WELLS	Depth (Ft.)	Started	Completed
Ayun Musa 1	5451	Dec. 23, 1944	July 29, 1945
Ayun Musa 2	5808	Aug. 24, 1945	Jan. 20, 1946
Asl 1	4328	Dec. 2, 1945	July 24, 1946 (suspended)
Sudr 1	3157	Feb. 15, 1946	May 24, 1946
Sudr 2	5961	June 2, 1946	.....
Nebwi 1	4537	Sept. 2, 1946	.....
Geham 1	....	(location made)	.....
Hamra 1	....	(location made)	.....

3. STANDARD OIL COMPANY OF EGYPT

Standard Oil Company of Egypt, Societe Anonyme, an affiliate of Standard Oil Company (New Jersey), was incorporated as an Egyptian company in 1937 since which time it has been active exploring the desert and the Red Sea areas. The company holds four petroleum prospecting licenses covering an area of 67,332 acres and 183 petroleum exploration permits over an area of 5,840,167 acres. Work was interrupted by the war from mid-summer of 1942 until late autumn, 1943.

Drilling Resumed in 1943

Standard of Egypt's work during 1937 consisted of geological reconnaissance supplemented by torsion balance and magnetometer work. In 1938 intensive exploration work was begun with investigations in the Gulf of Suez area. During this period two geological field parties, two gravity and magnetometer, and one torsion balance party were employed. As a result, in 1939 a drilling rig was brought to Ras Ruahmi, for a gravity prospect located 102 kilometers (63 miles) south of Suez on the west shore of the Gulf of Suez. Drilling began here in January, 1940, and was completed to a depth of 8282 feet in late May, 1940. Drilling equipment was then moved 50 kilometers (32 miles) south, to Ras Bakr, where two additional tests were drilled in 1940 and early 1941. Then the rig was shut down owing to impending dangers created by the war in North Africa.

Geological and geophysical work was expanded in 1939 and through 1940 and 1941 into other parts of Egypt, with concentration of effort in the Cairo-Suez, Gulf of Suez and Sinai districts. During this period gravity and reconnaissance geological surveys were conducted in the Western Desert. In 1941 activities in the Western Desert were restricted by military regulations and work in the other areas also was curtailed.

After the collapse of the Axis military threat in North Africa, drilling was resumed in late 1943 at Ras Bakr and continued to mid-summer, 1944, with the drilling of three more wells. The rig was then moved to Central Sinai where it drilled three wells from late summer, 1944, to early autumn, 1945. A second rig, purchased in 1945, started work in North Central Sinai early in 1946.

Toward the end of 1945, the rig of South Mediterranean Oilfields, Ltd., which had been operating 40 kilometers (25 miles) northwest of Cairo, was moved to the Abu Roasch structure. The Giza Pyramids, visible from the well location, are on the south flank of this structure. In late spring, 1946, the rig in Central Sinai, after completing three dry holes, was moved to the east shore of the Gulf of Suez and started to test a series of partly concealed structures south of Abu Zenima.

Geological work was again under way in 1944 with four field parties operating in Sinai and the Western Desert. Core drill and gravity meter investigations were undertaken in 1946 and air photographs of Northern Egypt were studied.

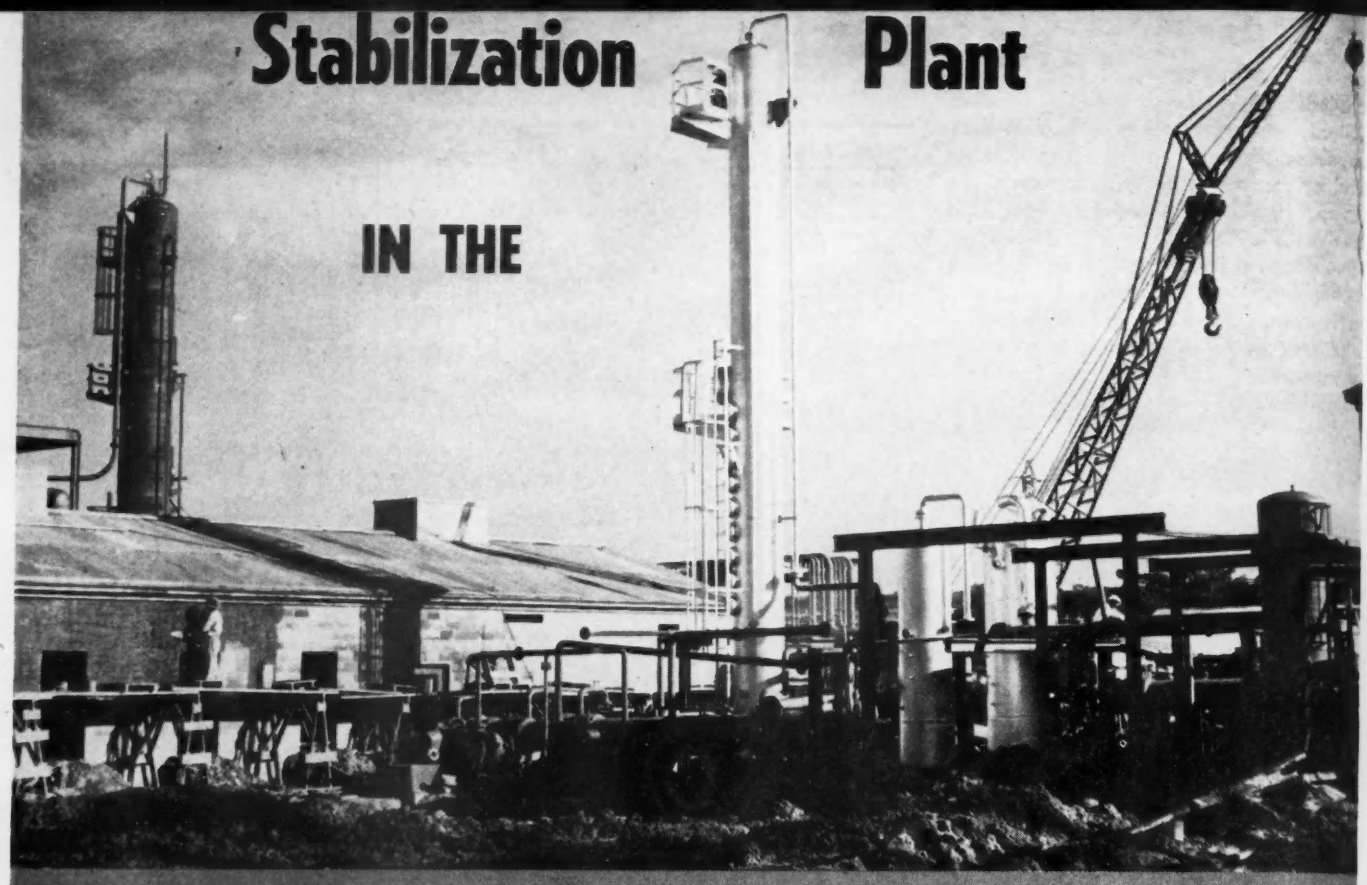
It is planned to continue geological and gravity surveys in 1947 and to supplement these by magnetometer and seismograph work. The geological parties and core drilling will be continued. Experimental seismograph work, as a joint venture with Anglo-Egyptian Oilfields and Socony-Vacuum, was begun in late 1946. A wholly-controlled company seismograph will be put in operation in Egypt in the summer of 1947.

Standard of Egypt's work is complicated by the danger from land mines still in the Western Desert. These are believed to be thickest along the coast, but are limited to the area west of El Alamein.

WELLS DRILLED BY STANDARD OIL COMPANY OF EGYPT

WELL	LOCATION	Started	Abandoned	Depth (Ft.)
Ras Ruahmi 1	Gulf of Suez	Jan. 2, 1940	May 21, 1940	8282
Bakr 1	Gulf of Suez	June 2, 1940	Oct. 10, 1940	3880
Bakr 2	Gulf of Suez	Oct. 23, 1940	Jan. 1, 1941	5162
Bakr 3	Gulf of Suez	Nov. 28, 1943	Mar. 10, 1944	5035
Bakr 4	Gulf of Suez	Mar. 28, 1944	May 27, 1944	4659
Bakr 5	Gulf of Suez	June 19, 1944	Ju'y 8, 1944	4000
Nakhl 1	Central Sinai	Nov. 17, 1944	Mar. 24, 1944	5566
Darag 1	Central Sinai	April 24, 1945	June 9, 1945	2768
Abu Hamth 1	Central Sinai	July 11, 1945	Feb. 15, 1946	7132
Abu Roasch 1	Western Desert	Jan. 18, 1946	Sept. 30, 1946	6289
Wadi Baba 1	Gulf of Suez	May 16, 1946	Sept. 25, 1946	4548
Ras Abu Rudeis 1	Gulf of Suez	Oct. 8, 1946	Drilling	6695
El Khabra 1	Northeast Sinai	Feb. 21, 1946	Drilling	10,052
Abu Roasch 2	Western Desert	Nov. 19, 1946	Drilling	3535

Stabilization Plant IN THE Jusepin Field, Eastern Venezuela



By GEORGE O. IVES
Staff Writer

ANOTHER step in the modernization of oil operations in Venezuela will be completed in May of this year when Creole Petroleum Corporation is scheduled to start its new crude stabilization, de-salting, and gas injection plant in the Jusepin field. This will be the second such installation in eastern Venezuela territory, the first having gone into operation in the late summer of 1946 in the Santa Barbara field.

Construction of these plants is a significant indication of the attitude of the operators of Venezuela's oil concessions. Such installations show a desire on the part of the companies to use the latest production and conservation methods, both for their own protection and for the ultimate good of the fields.

No problems of excess water production exist at this time in the Jusepin field, there are no problems of excess gas-oil ratios, and salt content of the crude stream through the pipe line to the terminals is still at allowable levels. However, when completed, the plant will have full facilities to handle these problems as they arise. The initial capacity for handling gas is not adequate for complete field operation, but is adequate to handle a sufficient amount from a representative area to serve as a pilot plant through which accurate operating technique and results may be determined through actual practice. Meanwhile plans already are being formulated for similar installations in other areas.

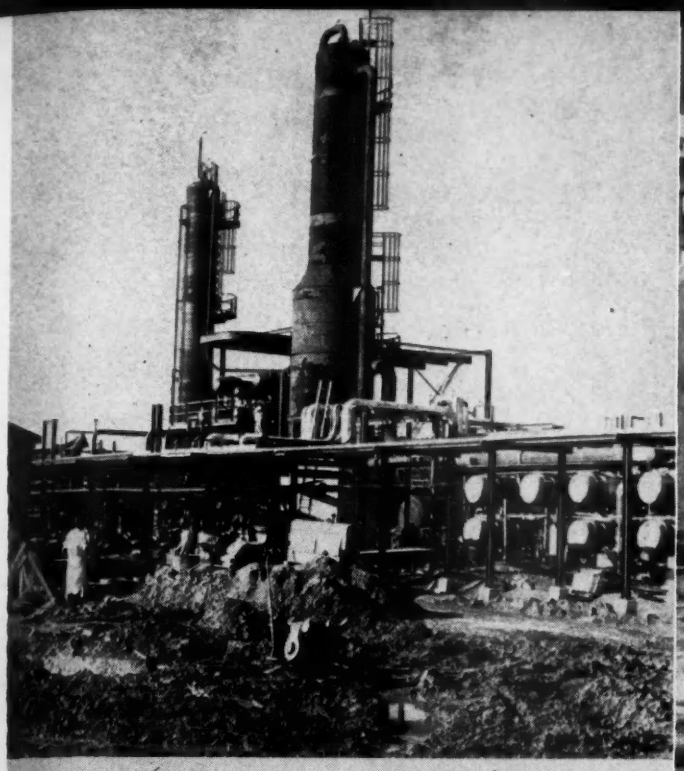
Jusepin field, together with other connected areas making up the Greater Jusepin region, contribute a substantial portion of the eastern Venezuela crude output, and represent a considerable investment.

Opened in 1938, the Jusepin-Mulata fields, operated as a unit by Creole Petroleum Corporation, have 557 producing wells, of which 160 are in the Mulata area. The first well on the latter concession was completed in 1941 after the Jusepin field itself had been in production for about 3 years. Producing structure of the group of fields is stratigraphic in nature with production from Miocene sands at depths ranging between 5200-5400 feet. Wartime development was rapid due to the urgent necessity of increasing allied crude supplies, but this proceeded in an orderly manner, with the result that current producing capacity of 85,000 barrels daily was built up without sacrificing availability of formation, geological, and engineering data. Most development came between 1943 and 1945.

In the opinion of competent observers, production has about reached its peak in these fields, with decline of older wells being just about balanced by the operation of six rigs within the field area. Hitherto all casinghead gas produced with the crude has been flared with the exception of that used for fuel, and although current gas-oil ratios of approximately 1600 to 1, are not excessive, in the light of most conservation experience, the attention of operators is now turning toward still more efficient operation and longer flowing life through re-injection of casinghead gas.

However, the installation is essentially a stabilization and de-salting plant, and although process gas is also put through an absorption tower and de-propanized, the heavier fractions in the form of condensate and natural gasoline is added to the crude which goes into the pipe line system. Present system of field water knock-out units is entirely sufficient to

At top of page—High pressure absorber for processing gas from Jusepin field manifold. Stabilized crude circulated as medium.



Above—Stabilization tower on right, condensate recovery section on left. At right—Battery of electric centrifugal pumps designed to handle Jusepin crude through stabilization and de-salting units.

take care of most field water, but the brine is most concentrated, and the allowable amount of water in the crude stream would carry a salt content above the minimum specifications, consequently de-salting units are necessary should there be any increase in water going into the crude stream. When water becomes excessive, the plant under construction will have a high-pressure dehydrating system to take care of it.

Normally there have been high losses of butanes, propanes and hexanes from tankage during transportation, and by stabilizing at the field, a much more satisfactory handling of crude will be attained.

Details of Operation

Production will flow into the plant from field manifolds operating at 250-pounds pressure, being taken directly into the plant at the point where it is now going into the second stage at the pipe line pump station. It will go into plant surge tanks where a back pressure of 100 pounds is held, thence through heat exchangers into the stripping tower where it is brought to 235 degrees at 20 pounds pressure. Using steam as stripper, it comes out at the bottom, a practically propane-free crude. Some butanes and pentanes are also taken off at this point. The first tower has only two theoretical plates. The overhead gas goes into condensers where the uncondensed portion is put through an 800-pound, 2-stage compressor. The liquid goes into the stabilization tower and the gas goes in through two stages of compression at 350 pounds. There it is de-propanized through a 30-plate column and propane and lighter fractions are flared.

Crude from the bottom of the stripper, still at a temperature of 235 degrees, is sent through additional heaters to bring it up to 300 degrees. At that temperature it is mixed with fresh water for washing and dilution of the salt water before going into the de-salter section. The system to be used here is the same as that in several United States refineries, where is used a silica sand bed coalescer with 200-pounds-per-square-inch pressure on drums after going through an emulsifier. From the coalescer it goes into the settling drums, still at 200 pounds pressure, where water drops out and the crude is circulated back through heat exchangers and coolers, after which it is blended with cooled gasoline from the bottom of the stabilizer and run to floating roof storage, going to storage at 8½ pounds vapor pressure at 110 degrees temperature.

The gas processing and injection system is coordinated with the plant in order to take advantage of compression equipment and heat transfer, and stabilized crude is circulated back through the high-pressure gas absorber to act as an absorption medium. As a medium it is not stripped of the gasoline and condensate, but circulates directly to storage and the products remain blended in the crude stream.

High Pentane Recovery

The pilot plant is scheduled to use 10 million cubic feet of gas daily picked up at 250 pounds per square inch intake pressure from the manifold at the flow station in immediate proximity to the plant. After going through a scrubber it is compressed, in two stages to 2200 pounds, using 1600 horsepower compressors. The interstage gas at 750 pounds is circulated through an absorption tower, using as the medium, the stabilized, de-salted crude before the gasoline is blended. The overhead from the 750-pound tower then goes into the second stage of compression where it is brought up to 2200 pounds for injection into the formation from which the crude was produced. It is estimated that there should result a recovery of about 85 percent of pentanes.

Capacity of the stabilization units will be 40,000 barrels daily, initially, which should be sufficient to insure an acceptable crude stream since the production of Jusepin field is just under 56,000 barrels daily. The injection of gas, scheduled to start at only 10,000 Mcf, is to be handled carefully to determine the engineering feasibility of re-injection in this area, and to observe reservoir behavior after injection starts, and how much will be necessary to produce desirable results. It is planned to use carbon monoxide in injected gas as a tracer so that results can be checked with greater accuracy.

In conjunction with the processing plant, there is also

Field surge tank with heat exchangers against incoming o.l for strippers. Jusepin stabilization plant.

being constructed a hugh electric power plant to augment the power now furnished from the Caripito plant, and to furnish steam for the processing plant. The power plant, when completed, will have main equipment consisting of two 5000-KW steam turbine driven generators now being installed, with a third unit on order. Power will be generated at 6900 volts and stepped-up to 33,000 volts for transmission lines. The plant's output will be synchronized with the power from the 12,000-KW plant at Caripito which furnishes power through lines extending from Caripito through Quiriquire, Jusepin and Mulata. Electric power is used on main-line crude pumping stations, camps, shops, for 3600-horsepower compressors at Quiriquire, and will furnish some 1600 kilowatts to the stabilization plant.

Water Drive Remote

Steam is to be generated at 400 pounds in three 85,000-pound-per hour boilers for driving generator turbines and for use in stabilizer plant heaters. Approximately 60,000 pound-hours of steam will be used by the plant.

The control houses, laboratory, and office will be air conditioned, and the compressor station and switch house will have forced ventilation.

A separate plant is in prospect for the Mulata field, but final blue-printing will await results from the Jusepin set-up.

With a seven-year history of performance now available at Jusepin, and slightly less at Mulata, it is thought that the possibility of an effective water drive in the field is extremely remote.

Although generally handled as a single field, the Jusepin and Mulata areas, directly adjoining and with no break in productive area, are probably a single accumulation, but with separation by both sedimentary and structural conditions, so that they are not a single continuous reservoir, and have different water levels. So far they are both flowing fields, the first pumps having been installed during the latter part of 1946, and starting the year with only 7 pumping wells out of 557 producers. All of the pumping wells are in Mulata, none in what is considered the better part of the field.

In Jusepin itself, the productive area covers approximately 14,000 acres. Although all sands are in the Miocene, there are as many as 21 different sand bodies recognizable in the main producing part, which will average about 85 feet effective thickness throughout. Maximum thickness of sands runs up to about 250 feet. However, only a few of the sands are continuous throughout the area, and these main sands average about 20 feet thick. Dual completions are made wherever possible. Depths of wells in Jusepin proper average 5200 feet, while Mulata averages 5400 feet. Gravity of Jusepin crude averages 32.8 degrees, while Mulata, slightly lighter, averages 33.5 degrees.

Drilling and completion conditions in the two fields are not difficult or unusual. Normally wells will carry approximately 11-pound mud, and most wells will make mud fairly well which requires little artificial weighting. Some sections of the field where there are overlying gas sands require rather exacting mud control, and weights sometime reach 15.5 to 15.8 pounds to the gallon.

A 9⅝-inch surface string is landed between 500 and 800 feet, and the first 2000 feet below the shoe is usually made with one Zublin bit. From there down it is rock bit drilling, and usually requires 6 or 7 rock bits. Normal completion method is to set 5½-inch casing through the formation and gun-perforate. Total drilling and completion time is about 30 days per well.

No Field Tankage

Field gathering stations have no tankage—only manifolds and separators. Oil flows through field manifolds under field pressure to the main station. Fourteen such manifold stations are needed in Jusepin and 7 in Mulata.

The outlook for increased productive area in the immediate vicinity of Jusepin are not too encouraging, a number of wildcats having been drilled on all sides of the field. Through most of 1946 five of the 13 rigs in operation in the area have been engaged in exploratory drilling, going to depths of approximately 10,000 feet.

German Field, Reitbrook Almost Ruined During War

PRODUCTION was pulled so hard during the war years, when Germany was making every effort to increase its supply of petroleum to satisfy its huge military machine, that the Reitbrook field, located about 10 miles southeast of Hamburg, was almost ruined. It was salvaged just in time to prevent complete flooding. By consistent repressuring and careful use of water drive, the oil-water table has been flattened out and indications are that it will produce for 7 or 8 more years.

By J. BRIAN EBY
Special Staff Representative

THE Reitbrook oil field lies about ten miles southeast of Hamburg and north of the Elbe River. It is formed by a large uplifted salt mass, overhanging to the east, and is associated with much folding and faulting in the overlying strata. The first indications of oil or gas were found in 1910 by a water well which was drilled for the Hamburg water supply and which blew gas in large quantity from beds of lower Oligocene age. Two or three other gas wells were drilled and over 270 million cubic meters (9.5 billion cubic feet) of gas were produced up to and including 1925, when the pocket was exhausted.

Discovery in 1937

Some wildcatting was carried out for oil in the following decade but nothing was discovered of interest during that period. In 1935 systematic gravity and refraction geophysics was started by a German oil company from Berlin, using equipment of the Seismos Company of Hanover. Based on geophysical data the discovery oil well was completed in August, 1937, finding commercial oil in a porous limestone in Upper Cretaceous beds. The entire field is now owned and pooled on a fifty-fifty basis by Deutsche vacuum Oel, A.G. (Socony Vacuum) and Preussag, a German company of Hanover.

The size and shape of the field is shown by Figure 1, a map of the field, showing all wells drilled and drilling as of October, 1946. The map shows all faults, and the 1200 meter (4000 feet) contour on the salt plug. The contours on top the Cretaceous are also indicated insofar as practical due to the very complicated pattern of faulting.

THE author acknowledges with kindness the cooperation of the officials and geologists of the Deutsche Vacuum Oel, A.G. in Germany. Phillip Clover, representing Socony Vacuum Oil Company in Hamburg, arranged for Dr. Hans Pfefferkorn, a director of the company, to accompany the writer to the field at Reitbrook. On arrival in the field, Dr. Rolf Behrmann, geologist in charge of the field, took the greatest pains to go over the records and the property. The maps, charts, structure section and columnar section were prepared by Dr. Behrmann. The field, due to the importance of its position, production and long history, came very much under the Nazi eye, but never was expropriated from its rightful owners, although the handling of the field was, at times, 1938-1941, tampered with disastrously. The true picture of the field is of great interest.

—J.B.E.

Similar to Louisiana

The nature of the faulting is best indicated by the cross section, Figure 2, showing a fault pattern similar to many of the Louisiana salt domes—Charenton in particular. It is, of course, quite obvious how futile surface geology is under such conditions of subsurface structure. The nature of the overhang, established by wells T-1 and T-4, is clearly presented by the cross section. Well No. T-4 is temporarily shut down at about 2900 meters but preparations are going forward to deepen the well.

The formations encountered by drilling at Reitbrook are shown by Plate 3, a columnar section, showing also all known oil and gas occurrences and the customary casing programs for the field. A typical electric log is given, as the subsurface structure is determined by these data. The accurate and detailed use of electric logs is further indicated by the cross section, Figure 4. Something of the complexity of the correlation problems can readily be seen and how indispensable these logs are in the field.

The main producing horizon of the

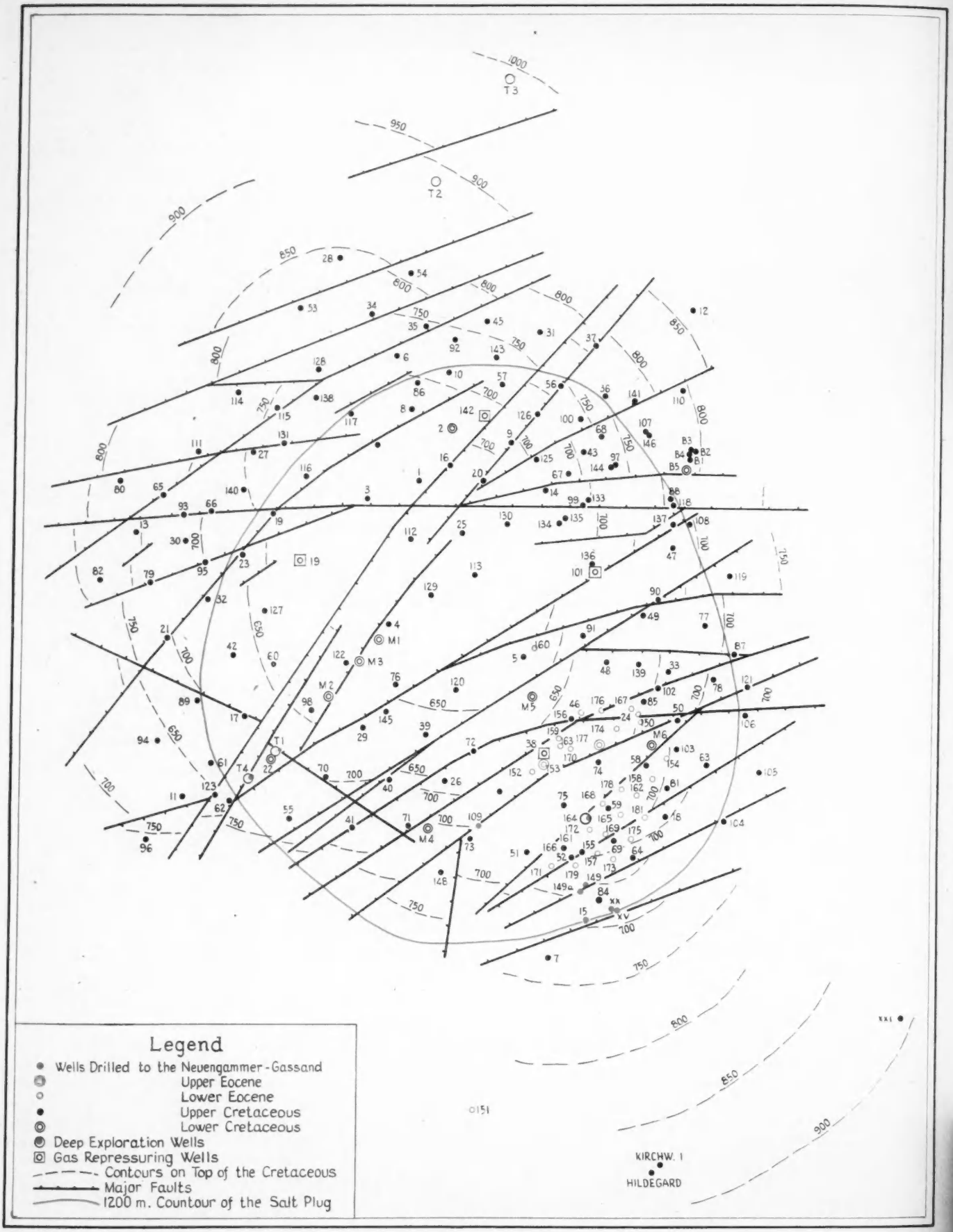


FIGURE 1. Structure map of the Reitbrook field, near Hamburg, Germany

field is the porous lime at the top of the Cretaceous. This lime has a porosity of about 25 percent, and a low permeability of about 2 millidarcys. The Cretaceous area is drilled up, and now has 60 producing wells, of which 45 are flowing and 15 pumping or gas lifted. The oil, which is 21.3-gravity, asphaltic base, is choked from 4 to 1.5 millimeters. This develops a tubing pressure of 20 to 30 atmospheres (14.7 pounds per atmosphere), and casing pressures up to

FLAME HARD

Trade Mark

Slush Pump Liners and Piston Rods

For many years, the Houston Slush Pump Repair Company has rendered a better service in all the phases of slush pump repair. An important part of this work has been the reconditioning of liners and piston rods. This service has been recognized as the best available.

NOW! The Houston Slush Pump Repair Company takes a step forward by creating the Houston Slush Pump Company, which is devoted exclusively to the manufacture of FLAME HARD LINERS and PISTON RODS in all sizes for standard slush pumps! All the "Know How" acquired from years of experience has been put to the task of making FLAME HARD LINERS and PISTON RODS the best yet!

The Houston Slush Pump Repair Company has been a pioneer user of the flame hardening process and has found this method superior for use on slush pump liners and rods. We have availed ourselves of the largest and finest facilities for the manufacture of liners and piston rods.

Thus FLAME HARD LINERS and PISTON RODS are products of incomparable ingredients, namely: EXPERIENCE, BETTER HARDNESS METHOD, FINEST EQUIPMENT!

FLAME HARD LINERS

Forged from high quality steel. The hardness is 59RC (610 Bhn) or above, and is completely uniform over the entire length of wear surface. The hard case is ⅛ inch (approx.) deep and cushioned to the core. All FLAME HARD Liners are 100% inspected for hardness at 8 points within the liner. The actual Rockwell C hardness readings are stamped on the liner and are guaranteed correct. This is your assurance that every FLAME HARD Liner is fully and uniformly hard over the entire wearing surface.

FLAME HARD PISTON RODS

Made of high strength rolled bar. The flame hardened wear surface is the same as that of the FLAME HARD Liners. The same 100% inspection is applied and the hardness number is stamped on each for your protection.

WRITE FOR A 1947 FLAME HARD CATALOG

HOUSTON SLUSH PUMP COMPANY, INC.

2112 QUITMAN • P. O. BOX 2112

PHONE C-7151 HOUSTON 1, TEXAS

VAL R. WITTICH, JR.
30 ROCKEFELLER PLAZA
NEW YORK 20, NEW YORK

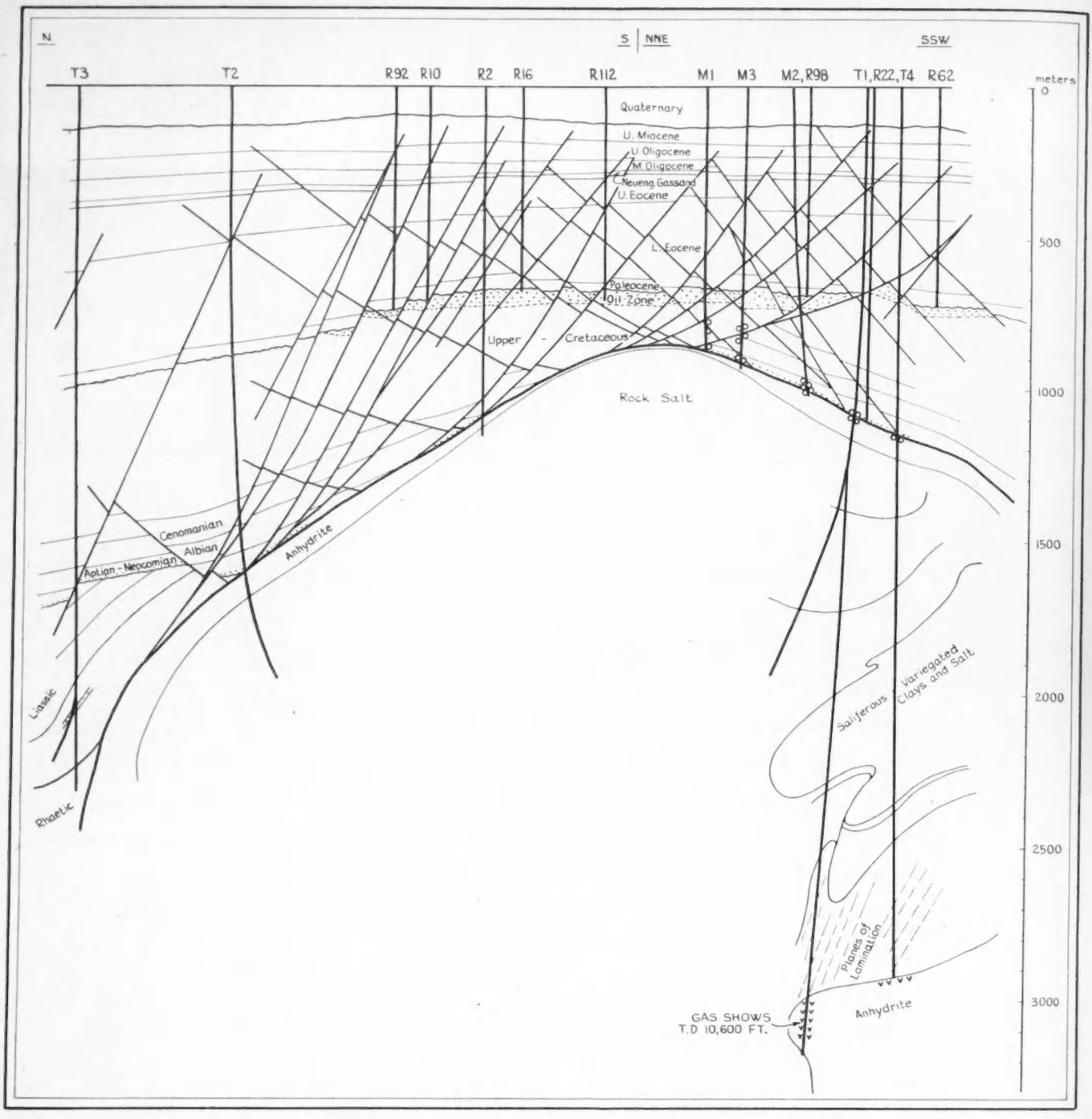


FIGURE 2. Cross-section through the Reitbrook field structure

65 atmospheres. Wells are not permitted to flow incessantly but only from 1 to 4 hours per day. Pumpers usually pump only 1 hour daily. Flowing wells produce about 2 to 3 cubic meters (6 barrels per cubic meter) daily and the pumpers produce about 1 cubic meter daily. Total daily production for Reitbrook is about 100 cubic meters (600 barrels).

Reitbrook Annual Crude Production

YEAR	Tons	Barrels
1937	1,122	7,854
1938	65,600	459,200
1939	189,811	1,328,677
1940	357,154	2,500,078
1941	212,667	1,488,669
1942	104,031	728,217
1943	51,965	363,755
1944	35,922	251,454
1945	34,400	240,800

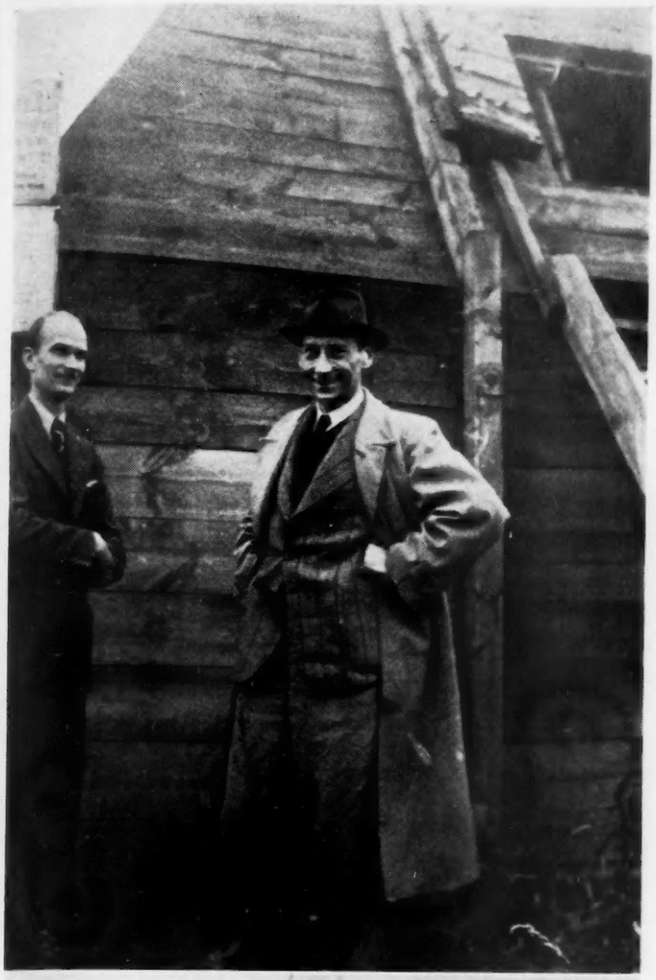
The production and drilling history of Reitbrook is shown by Figure 5. This diagram shows clearly the effects of the war on this field, how production was pulled so hard that the reservoir pressure was practically exhausted by 1941. When the rapid decline in production, after the 1940 peak, was finally realized by the non-technical Nazi officials, the oil field was reluctantly turned over to proper, competent direction for restoration. However, the gas cap had been depleted, the water level broke through the oil zone in many places and the actual saturated oil zone in the Cretaceous lime section was diminished from an original 65 meters (214 feet) in thickness to a mere 8 meters (25 feet) as of the present time. The field was

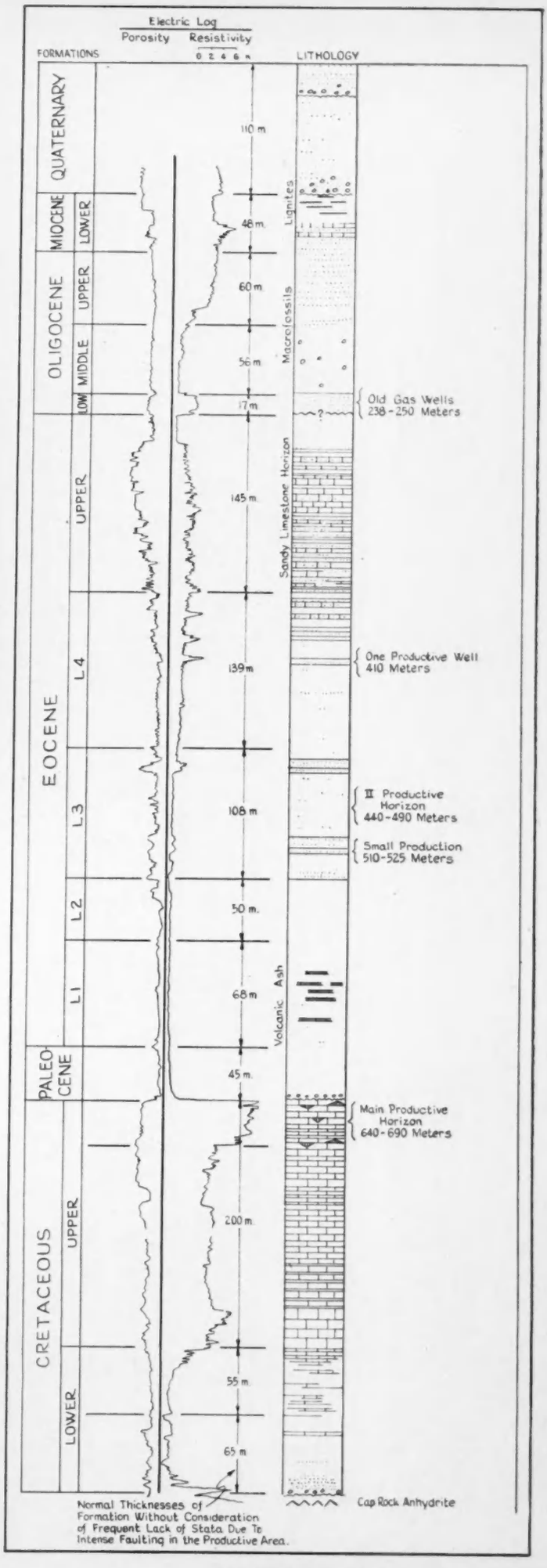
On opposite page:

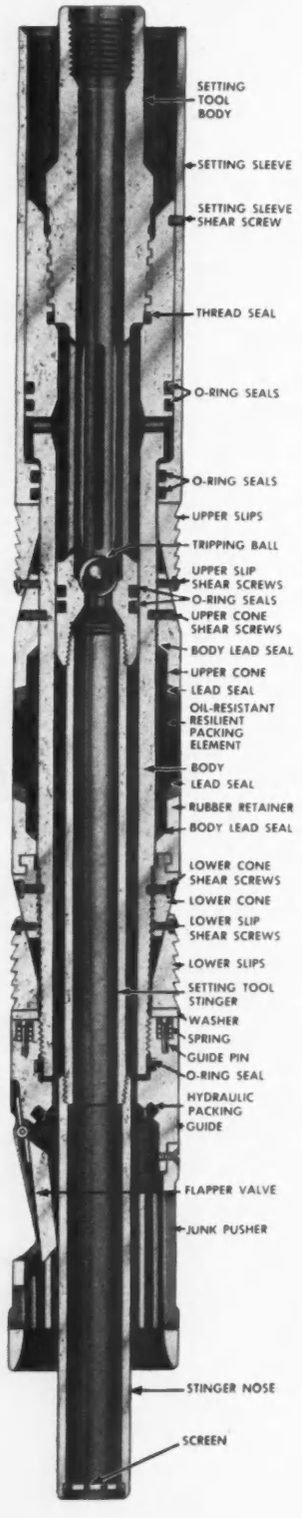
Top photo shows Dr. Hanns Pfefferkom, director (with overcoat) and Dr. Rolf Behrmann, geologist, Deutsche Vacuum Oil Company A.G. in Reitbrook field, Germany. Discovery well of field in background. Fencing was protection against bombs.

Lower photo shows the Deutsche Vacuum Oil Company A.G. well T-4 on flank of Reitbrook field, which is to be deepened to 10,000 feet.

Figure 3, on the right-hand side of the page, shows the geological formations of the Reitbrook field.




Electric Log
Porosity Resistivity
0 2 4 6 n
FORMATIONS
LITHOLOGY
QUATERNARY
MIOCENE
LOWER
OLIGOCENE
UPPER
LOW
MIDDLE
UPPER
EOCENE
L4
L3
L2
L1
PALEO CENE
CRETACEOUS
UPPER
LOWER
110 m
48 m.
60 m.
56 m.
17 m.
145 m.
139 m.
108 m.
50 m.
68 m.
45 m.
200 m.
55 m.
65 m.
Lignites
Macrofossils
Sandy Limestone Horizon
Volcanic Ash
Old Gas Wells
238 - 250 Meters
One Productive Well
410 Meters
II Productive
Horizon
440 - 490 Meters
Small Production
510 - 525 Meters
Main Productive
Horizon
640 - 690 Meters
Cap Rock Anhydrite
Normal Thicknesses of
Formation Without Consideration
of Frequent Lack of Strata Due To
Intense Faulting in the Productive Area.



7 REASONS

why you will want to use the Baker Model "D" Retainer Production Packer

IT HOLDS BOTH WAYS – Packer is anchored against either *upward* or *downward* movement by two full sets of opposing slip segments. This feature is always desirable, and is vital in gas-injection or water-injection wells where constant pulsation is present.

IT IS COMPLETELY DRILLABLE –You will never have to "milll up" a Baker Retainer Production Packer; and as one user said, "It's lots easier and cheaper to 'drill 'em' than to 'mill 'em'."

IT IS CORROSION RESISTANT –with cast iron construction that is far more resistant to corrosion than the steel casing in which the packer is set. In one important field 82 Baker Retainer Production Packers were set in wells containing hydrogen sulphide-bearing gas which had developed casing leaks in a number of wells. Packers were set above the producing zone to confine production to the tubing and isolate the casing from the destructive gas. After 5 years, one packer was replaced, and then *only* to re-work the well.

TUBING IS FREE FROM PACKER –an advantage that goes hand-in-hand with drillability, and always means that you are "well insured" against trouble.

NO "SET-DOWN" WEIGHT IS REQUIRED –When it is desirable, the tubing can be suspended in tension (see Fig. 6) so that pressure bombs (and other devices) can be readily dropped through the tubing. You are not handicapped in your operations by "corkscrewed" tubing, often resulting when set-down weight is applied to conventional type packers.

ADAPTABLE TO *ALL* WELL CONDITIONS – and all operating procedures such as two-zone production, water injection or flooding, re-pressuring, re-cycling, testing, acidizing, gas lift, and many other routine as well as difficult applications.

IT IS MADE BY "BAKER" – developed over a period of years, field tested and perfected until we are now able to offer it to you, knowing that it will give you safe, efficient and economical service in any recommended application.

DETAILS EASILY SECURED

The Baker Model "D" Retainer Production Packer is described and illustrated in the 1947 Composite Catalog, and in the 1947 Baker Catalog which we will send to you upon request. Recommendations for use in *your* wells are available from any Baker office or representative.

A Portrait of

SUCCESS

OPERATION IS SIMPLE AND POSITIVE

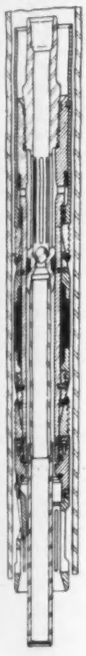


Fig. 1. Packer has been run-in to desired depth; Tripping Ball dropped and seated, which prevents further passage of fluid thru packer. Hydraulic pressure is now built up at surface.

Fig. 1

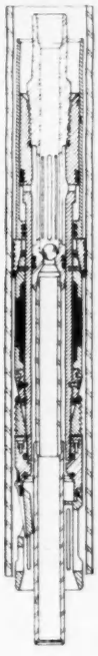


Fig. 2. Hydraulic pressure has sheared the shear screw in the Setting Sleeve which moves downward, forcing the Upper Slips down on the Upper Cone and outward against the casing I.D.

Fig. 2

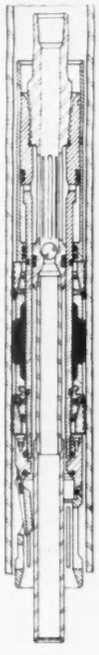


Fig. 3. While maintaining hydraulic pressure, an upward strain sets the lower slips and causes the Packing Element and Lead Rings to pack-off against the casing I.D.

Fig. 3

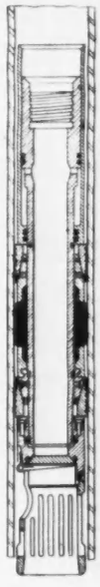


Fig. 4. The Setting Tool has been removed and the Flapper Valve (on lower end of Packer) has seated and closed off the lower formation. Packer is permanently set, and tubing and tools can be run through it.

Fig. 4

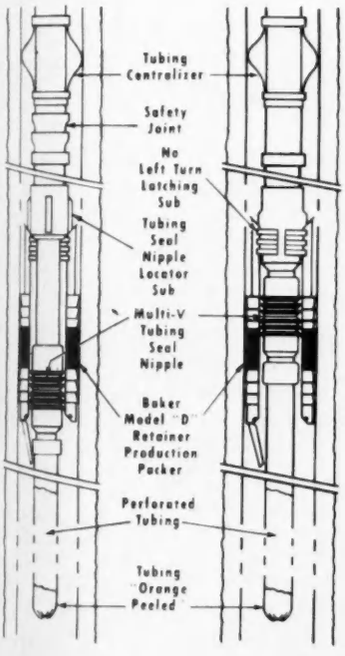


Fig. 5

Fig. 6

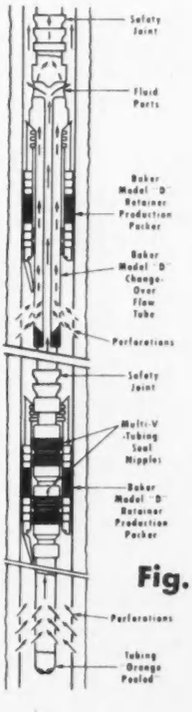


Fig. 7

Fig. 5. Using a Baker Model "D" Retainer Production Packer with necessary accessory equipment in a Two-Zone production hook-up.

Fig. 6. Packer is used in Two-Zone production with a Latching Sub to prevent movement of the tubing Seal Nipple due to contraction or expansion of tubing string.

Fig. 7. Using a Two-Zone production hook-up to pump or flow an upper zone through the tubing, and flow a lower zone through the annulus between the tubing and casing.

BAKER OIL TOOLS

BAKER OIL TOOLS. INC., LOS ANGELES • HOUSTON • NEW YORK

BAKER
RETAINER
PRODUCTION PACKER

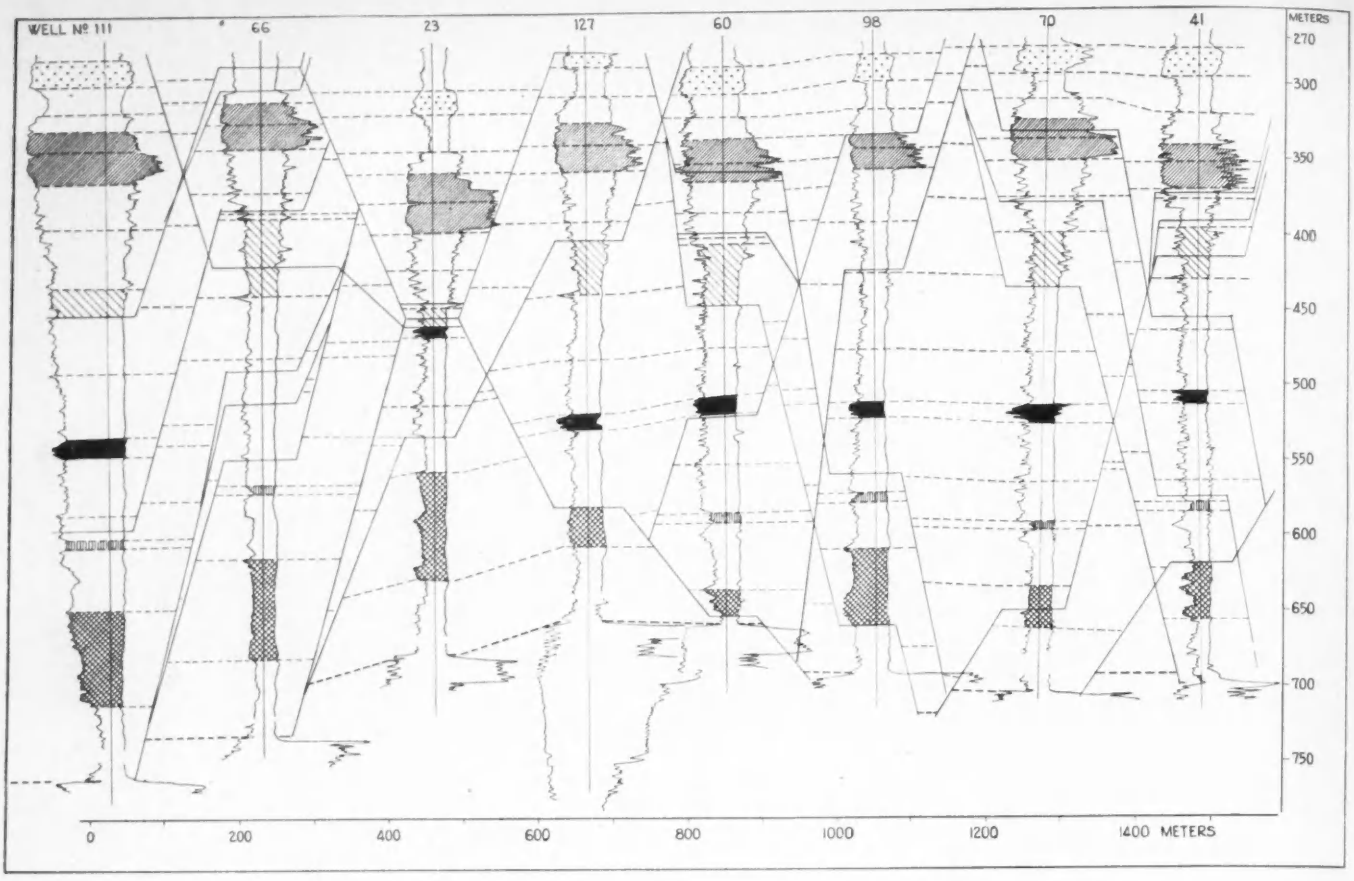


FIGURE 4. Electric log cross section, Well 111 to 41, Reitbrook oil field, Germany

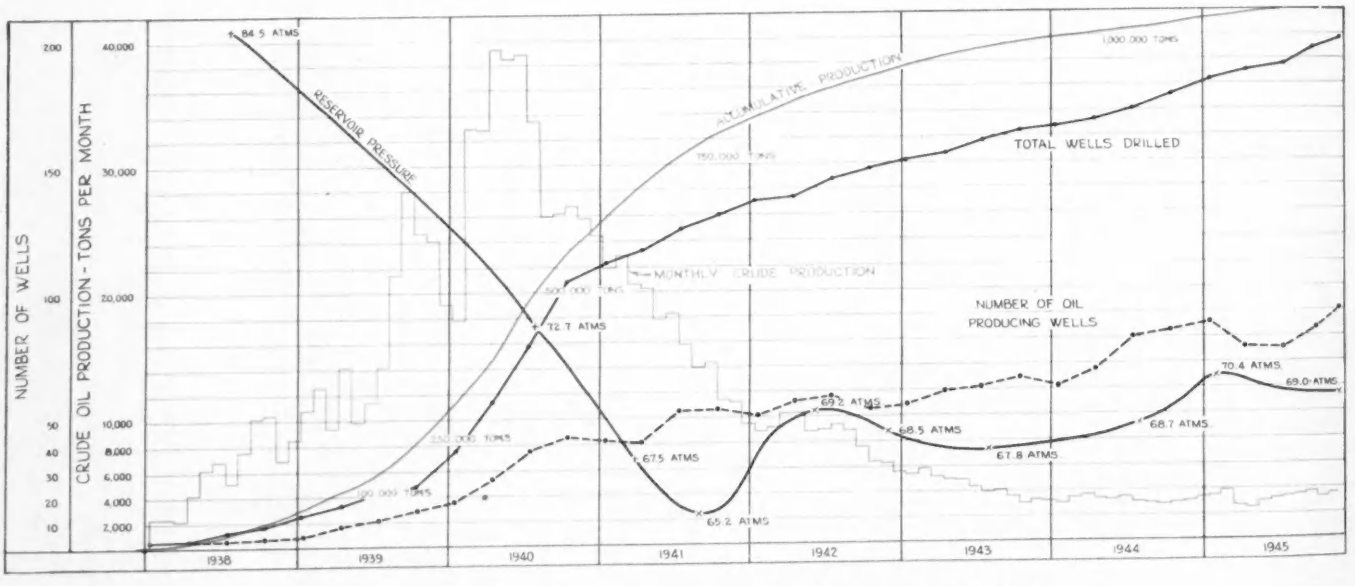


FIGURE 5. Drilling and production history of the Reitbrook oil field

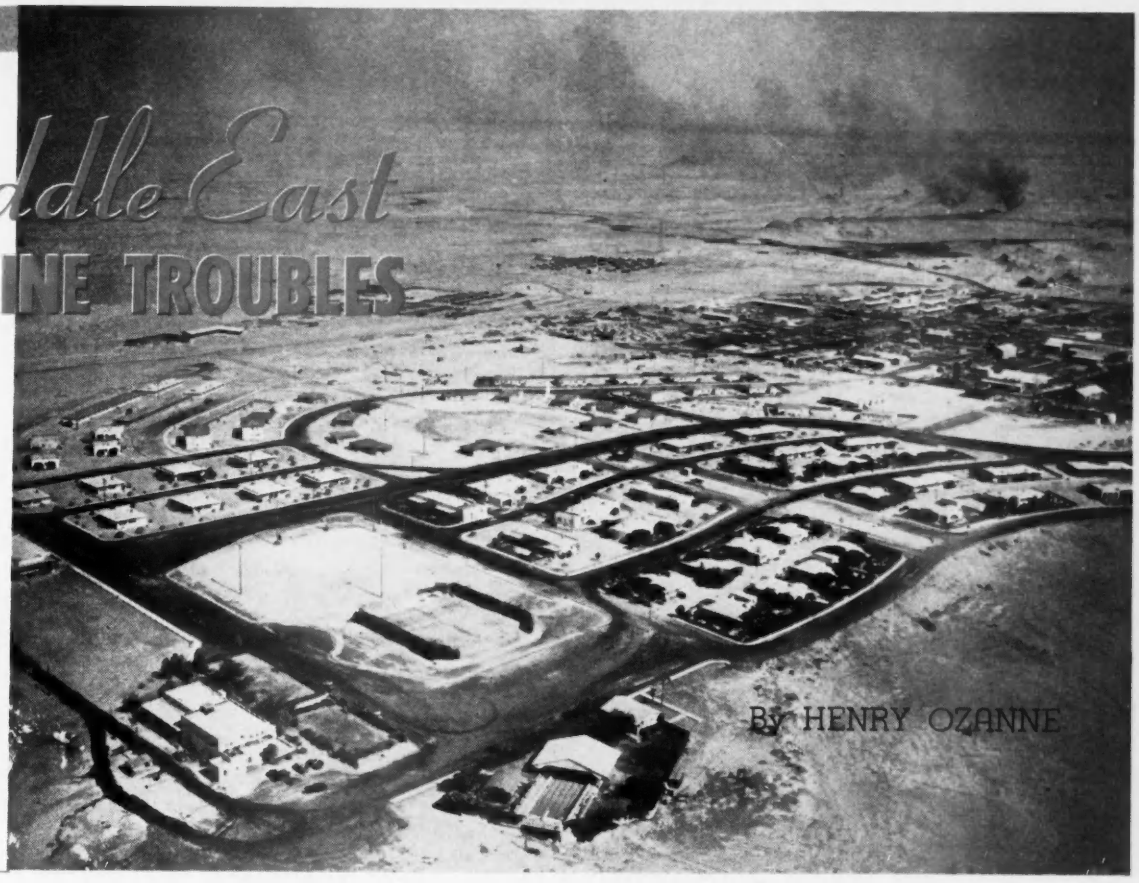
salvaged just in time to prevent complete flooding.

Early in 1941 efforts were started to restore and maintain a reservoir pressure, first by conserving the natural water pressure and second by repressuring with natural gas and later flue gas. Four wells were selected for gas repressuring as indicated on Figure 1, the map, and the gas was injected at 70 atmospheres (1032.5 pounds). There was much trouble by gas by-passing in fissures. By middle 1942 the pressure was built up to about 69 atmospheres (see Figure 5). By consistent repressuring and careful use of water drive, the oil-water table has been successfully flattened out. It is now estimated that for each 70 cubic meters (2500 cubic feet) of gas injected 1 extra cubic meter (6 barrels) of oil is produced.

The cost of repressuring is figured now at 7 marks (70 cents) per ton (about 7 barrels) of oil produced. Crude oil is valued at Reitbrook at about 120 marks ($12) per ton. Ordinary production costs are as much as 50 marks per ton due partly to high cost of materials and the cost of electricity used in some drilling and all pumping. Wages are fixed by law and all the help is German.

There are 6 rigs (5 rotary, 1 cable tool) now operating, all German equipment, but breakdowns and lack of proper equipment delay progress. A lower Eocene sand, about 6 meters thick, is now being developed. With careful handling the Reitbrook field should produce for 7 or 8 more years.

Middle East PIPE LINE TROUBLES



Headquarters of Arabian American Oil Company in Saudi Arabia are located at Dhahran, shown here, near the Dammam field (note two derricks in background), which will supply oil for the Trans-Arabian pipe line.

By HENRY OZANNE

TEMPORARY collapse of negotiations between Trans-Arabian Pipe Line Company and the Syrian government threatens to precipitate an international squabble in the Middle East. The Lebanese republic is accusing the government of its sister republic, Syria, with a short-sighted and destructive policy that will work against the interests of both the Arab nations.

These accusations, made by Alfred Naccache, president of the parliament of the Lebanese republic, also bring to light the extremely fantastic demands of the Syrians on the American oil company in return for transit and protection rights of the proposed line through Syria in its course from the Saudi Arabian fields to the Mediterranean.

Both Trans-Arabian and Anglo-Iranian Oil Company had hoped to conclude negotiations with Syria before March 1 and thus complete all needed legal arrangements for the route of the new pipe lines which both companies had planned to get under way this year. Both lines must go through either Syria or Palestine, and Syria was favored by both the Americans and the British because of current political disturbances in Palestine. However, when company negotiators met with Syrian officials in Damascus, the oil men were handed a virtual ultimatum carrying prohibitive royalty and transit charges. One of the company representatives told a representative of THE OIL WEEKLY:

"The amount of money that Syria asked for transit and protection rights alone is more than the total current royalty bill to King Ibn Saud. In other words, Syria demands more to let us route the line through its territory than we are paying on our production in the field."

But the fatal knot was tied in the snarled negotiations when the Syrians added a final clause to the proposed contract specifying that the line's terminal must be located in Syria, and that practically means Latakia on the North Syrian coast.

Anglo-Iranian virtually announced it would engage in no more negotiations with Syria until Trans-Arabian was able to make some headway on its own case. A Standard Oil Company (New Jersey) representative who had been here on the ground with the Anglo-Iranian delegation participating in the deliberations, returned to America after the parley broke down.

Burt Hull, president of Trans-Arabian, and Captain Finney of Jersey Standard, top pipe line experts, had surveyed the whole Eastern Mediterranean coast and were prepared to make final engineering recommendations for the location of the pipe line terminal. With the collapse of the negotiations, Captain Finney headed back to New York.

President Naccache of the Lebanese Parliament told that body in a special session on March 13:

"Trans-Arabian Oil Company concluded an agreement with our government. This accord, ratified by this chamber, foresaw the terminal of the pipe line along the Lebanon coast. But when the company decided to execute the project it was hindered by the refusal of the Syrian government to permit the pipe line to cross Syrian territory. Syria also holds that the terminal must be situated on its coast.

Forced to Palestine

"In the face of such a situation, the oil company finds itself obliged to enter into negotiations with the Palestine government toward the end of obtaining transit rights through Palestine.

"This position of the Syrian government will profit the Palestinian Zionists to the amount of one billion Lebanese Pounds" (about $450 million).

Joseph Salem, a Lebanese Parliament member, said that completion of Trans-Arabian's line through Syria to a terminal on the Lebanon coast would be worth $350 million eventually to his country, and would result in employment for 30,000 Lebanese citizens. He estimated that about 7000 Lebanese could find permanent employment in some capacity in connection with the line when it went into operation.

Salem demanded that the Lebanese government "send without delay an official delegation to Damascus, charged with negotiating an accord with the Syrian government."

Rehabilitation in N.E.I.

Report From London

By
E. N. TIRATSOO
Staff Writer for
The Oil Weekly

THE Netherlands Colonial Petroleum Company which is an affiliate of Standard Vacuum Oil Company has a labor force of about 2000 men making repairs to the refinery at Soengai Gerong.

The company's technical staff has not had opportunity of making a detailed inspection of the oil wells of southern Sumatra, which normally supplied the refinery with an average of 45,000 barrels of crude oil daily. However, it is hoped that this inspection will be possible before long.

The number of men engaged on oilfield and refinery rehabilitation work is still limited by available food resources and consumer goods, which form the only possible means of wage payments at present, owing to currency difficulties. Complete restoration of the refinery will depend upon arrival of special equipment expected from the United States. In addition to repairs on the refinery and in the fields, it may be necessary to do considerable work on the connecting 85-mile pipe line.

The company's deep water collecting and storage center at Tandjong Oeban in the Riouw Archipelago near Singapore also is being restored with a capacity increased over prewar days. Progress here is reported to be highly satisfactory. The Tandjong Oeban installation was almost destroyed during the war, but when the present work is completed it is expected to have a storage capacity of 1.2 million barrels.

Geophysical Work Progress in England

Anglo-Iranian Oil Company is carrying out, through its D'Arcy subsidiary, an extensive geophysical prospecting program in England comprising gravity meter, magnetometer and seismic refraction surveys.

A gravitational investigation is at present being conducted in the area between Bristol and London. The area under survey extends over 5000 square miles, of which some 2000 square miles have so far been covered. In the southwest, this gravity survey overlaps an early gravity meter survey south of the Mendip Hills by Gulf Exploration Company Ltd.

The seismic work being carried out at present by Anglo-Iranian is a refraction survey, an area of northeast Yorkshire, near Redcar, having recently been examined. The object of the survey was to map the structure of the Permian magnesian limestone which had been found at 2400 feet in a well one mile south of Redcar.

Personals

E. J. Dunstan has been appointed general manager of Manchester Oil Refinery Ltd., and J. C. Wood-Mallock has been appointed refinery manager.

Professor V. C. Illing, head of the department of Petroleum Technology at the Royal School of Mines, London, has left for a visit to the United States and Venezuela.

Dr. A. E. Dunstan, chief chemist of Anglo-Iranian Oil Company, has retired. Dr. Dunstan has been associated with Anglo-Iranian for more than 30 years and has done most valuable work on the chemistry and refining of Persian crudes. He started the original Sunbury research station in company with Dr. Thole; this was one of the first oil research laboratories in the world, and is now one of the largest.

Dr. Dunstan was a member of council of the Institute of Petroleum since its early days, and was honorary editor of its Journal for 25 years. He was president in 1929-1931, was awarded the Redwood Medal in 1938, and was elected an honorary fellow of the institute in 1945. At various times he served as president of the British Association of Chemists, and vice president of the Royal Institute of Chemistry and of the Society of Chemical Industry. He was also managing editor of the encyclopaedic "Science of Petroleum."

Progress Reported In Papua Wildcat

Australasian Petroleum Company's wildcat test at Kariava in Papua, is drilling below 6500 feet after setting 9-inch protection casing at 5720 feet. H. L. J. Hunter, lately chief drilling superintendent of Anglo-Iranian in Iran, is on his way to take charge of Papuan drilling. A geophysical party from the United States has arrived in Papua and is preparing to start activity.

Aerial Survey of Kara Sea Area

The Soviet Arctic Institute recently sponsored an extensive aerial survey of the shallow Kara Sea area. This survey in which the aerial magnetometer was used here for the first time, covered an area of about 5 million acres.

Considerable prospecting activity also is reported in the Baltic region, where work carried out in the Esthonian and Latvian republics has been of particular significance. Oil shows have been found on several islands off the northern coast of Esthonia, and light oil has been found in an old well on Koksher Island. Asphalt deposits are reported from the Leningrad region of nothern Esthonia.

Gas Discovery Reported in Poland

Intense exploration for sources of natural fuel has been recently commenced in Poland, since the richest prewar gas zones (Daszawa and Kalusz) are now outside the Polish frontiers, and the other known resources of natural gas (at Jasielsk and Sanok) are not sufficient for the country's needs.

This exploration activity has recently resulted in the discovery of an important gas field at Debowiec, where a large volume of high pressure gas is available in a porous sandstone at a depth of 1,200 feet in a structure some 100 square kilometers (some 25,000 acres) in area.

Oil Production Drops in Germany

The crude oil output for the British Zone of Germany for December, 1946, and January, 1947, was about 329,602 and 306,376 barrels respectively. Compared with an average over the previous six months of some 371,000 barrels, these figures show an appreciable reduction, due mainly to cuts in electric power and severe weather conditions.

Exploration in Nigeria

The British Secretary of State for Colonies recently reported to the House of Commons in London that the exploration licenses in Nigeria of D'Arcy Exploration Company and Shell Overseas Exploration Company had been revived, and that the companies are presently engaged in exploration work in Nigeria.

with the REED *Kor-King* CORE DRILL

Kerr-McGee Oil Industries, Inc., using a Reed Kor-King Core Drill, drilled and cored 21 wells, using Oil Base Mud, in West Texas for the Gulf Oil Corporation, with an average of 99.25% recovery.

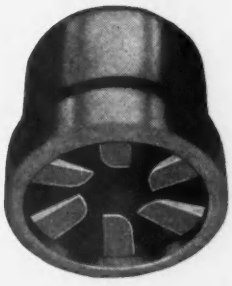
This high average recovery saved the operator and his client many hours coring time while recovering long, continuous, unbroken cores.

When you have a tough coring job see a Reed representative; or write the Reed Roller Bit Company direct and full information on the Reed Kor-King Core Drill will be furnished.

HARD FORMATION CUTTER HEAD

The non-rotating inner barrel operates against this simple oil-resistant, slush-lubricated bearing — helps to keep your barrel out of the repair shop.

SOFT FORMATION CUTTER HEAD



New hard and soft formation cutter heads last longer and cut faster.

The non-rotating combination Spring Ring and Toggle Type Catcher . . . positively holds soft or broken formation cores . . . cuts off and holds hard, solid cores.

ROLLER BIT COMPANY

P. O. BOX 2119 HOUSTON 1, TEXAS

LONDON
59 Wool Exchange
Coleman St., London E.C.2
England

NEW YORK
1836 RCA Building
New York 20,
New York

ARGENTINA
Santiago Del Estero 286
Buenos Aires,
Argentina

The Petroleum Laws of Mexico

By
ROSCOE B. GAITHER
B.S., LL.B.
Mexico City

SINCE expropriation on March 18, 1938, there have been many changes in the legal set up of the oil industry in Mexico. The Mexican federal constitution has been changed to permit more flexibility in the scope and terms of the organic petroleum law, putting into operation the terms of the constitution as thus amended. As the constitution now reads the only limitation provided for developing oil in Mexico is that "concessions" may not be granted. This constitutional amendment further reads that the respective law regulating the constitution shall determine the form in which the *nation* will carry out the development of petroleum products.

Roscoe Gaither

The making of an exploration contract, or of an exploration-exploitation-transportation-sales-refining contract is not prohibited nor even touched upon in the constitution, nor is there a limitation of time, nor of area, nor form, nor any bases fixed for executing contracts for oil development, except that the constitution continues to provide that the direct dominion of the oil in the subsoil belongs to the nation and foreigners may not exploit the deposits without agreeing to waive their recourse to diplomatic protection in case the government of Mexico should disagree with the other contracting party. This has been in the constitution since it was formulated in 1917.

Development Contract Possible

In effect an ordinary or post-May 1, 1917, concession under the constitutional provisions which existed prior to the existing amendment, really constituted a contract between the government and the concessionarie. A confirmatory concession constituted a possible exception which by treaty and subsequent local law became a grant of rights recognizing interests vested by private contract, or proof of intent, prior to May 1, 1917. Confirmatory concessions have not been issued since expropriation but pre-expropriation confirmatory concessions remain in existence where taxes have been paid.

The change in terminology from "concession" to "contract" should not therefore alter the basic rights of the contracting parties. A contract would in substance be similar to a concession. It would probably call for rents, royalties, drilling obligations and other conditions which form the basis for oil development.

The method to be determined by any petroleum law regulating the Mexican constitutional provisions for development of the nation's resources in oil, could vary infinitely with the congressional intent and the present law could be modified or a new law enacted almost without limit, except that the law could not grant a "concession" under the terms of the present constitutional provisions. It could provide the basic points of a development "contract" along lines for instance similar to the Venezuela law.

The present Mexican petroleum law enacted in pursuance of the existing constitutional provisions and following the intent of Congress under the past two administrations, is so restrictive that no foreigner may obtain a development contract nor may a foreigner own stock in an oil company to be organized under Mexican law. And as a further restriction, stock may not be bearer but must be nominative—that is the owner's name must be recorded on the books of the company and on the stock certificate. This is, of course, to make evident the actual ownership of stock and to prevent the ownership of stock in oil companies from falling into the hands of foreigners. Bearer stock passes, under Mexican law, in the same manner as title to currency passes, on delivery. Registered or nominative stock must not only be indorsed but transfers must be recorded on the books of the company.

The old petroleum law and its regulations have not been revoked. The new law amends the old and the new regulations amend the old regulations. The new petroleum law puts into operation the provisions of Article 27 of the Constitution as now amended. Thus the new law prohibits the granting of *concessions* for exploitation and determines the method or form in which the nation should carry out the development of petroleum rights.

Despite the constitutional provisions prohibiting the granting of concessions, the new law provides that concessions may be granted for transportation, for storage and distribution (natural gas by pipe line), refining, capturing and distillation of artificial gas. These concessions are for 50 years after which title to the construction, improvements, and other property passes to the government. These concessions may only be granted to Mexicans or to companies wholly owned by Mexicans. Stock of such companies may be transferred only to other Mexicans and these with prior permission from the federal government. Failure to comply with this provision subjects the concession to cancellation.

Provision for Concessions

It would appear then that under the petroleum law concessions may be granted by the Mexican government on all phases of petroleum activity except development. Therefore rights of exploration and exploitation of oil fields are granted by contract and subsequent refining and transportation rights are granted by concession.

Concessions for transportation include under the regulation, construction of pipe lines, storage plants, pumping stations and loading facilities and the use thereof, as well as railroads, telephone and telegraph systems and water lines. Gas lines for gas *not* produced in Mexico fall under a different category, and are not included in these transportation concessions, but instead require special permits from the Secretariat of Economia. Transportation concessions are granted as public carriers and require the concessionaire to carry oil and gas for any other company or individual at rates to be established by Economia; except that where the same company produces its own oil or gas, it may use one half of its monthly capacity, or if no other transportation is required by third parties,

the carrier may utilize all of its transportation capacity.

Concession Transfer Restrictions

A storage concession, apart from storage rights under a transportation concession, includes the right to construct and store oil in tank farms, as bailee or warehouseman but a company or individual producing oil needs no separate concession to construct its own storage facilities for its own use. However such storage facilities must allow one half of its capacity for storage of oil or gas or distribution of gas pertaining to third parties, who request the use of these storage or distribution facilities.

None of these concessions may be transferred to a foreigner nor to any company with foreign stockholders.

All petroleum operations fall under federal jurisdiction. This avoids molestation by states and municipalities, and facilitates litigation in the Federal Courts. Petroleum operations are of public utility. This permits expropriation of surface rights necessary for proper operation of the plants.

Consistent with the terms of the constitution the federal government has fixed various methods for the *nation* to carry out oil operations. These methods fall under three main categories:

1) Operations under a direct agency of the government.

2) Operations under public petroleum institutions.

3) Operations under contracts with individuals or companies.

Analyzing these methods:

1) The direct agency of the government is defined as the mining and petroleum section of the Secretariat of Economia. All exploration development and other operations under this category are handled directly by this department of the government entirely in the discretion of the government.

To date no work of this kind has been done by this agency. Before expropriation the mining and petroleum sections were separate. They are now one unit. There is a plan on foot now, again to separate these two important sections, but it is not anticipated that the government will enter into direct petroleum development through this agency.

2) Public petroleum institutions are defined as those public institutions or entities already created or which in the future might be created for purposes proper for the petroleum industry as a whole. There is no limitation as to the amount of property one of the public petroleum institutions might be assigned, but each surface unit or group may not exceed 30,000 hectares (74,100 acres). These institutions have a right of preference over private companies or individuals for the acquisition of property for development whether from the government or from individuals. These public petroleum institutions may only transfer on temporary bases the subsoil rights acquired by them to a "mixed economy" company, developed *post,* in this paper.

Pemex In Picture

The government company "Petroleos Mexicanos, S. A." ("Pemex") is the public institution created under the terms of this caption for the purpose of developing petroleum reserves already granted to such company and other reserves in the future so designated by the President of Mexico, including all property expropriated in 1938. This company may not sell oil in place nor the right to exploit such oil. It may sell anything else, apparently without limit as to place, price or purchaser.

3) Contracts for exploration and exploitation may be made for a maximum of 30 years, each contract for a continuous tract of land, maximum to be held by any one individual or company, 30,000 hectares (74,100 acres). Exploration must be completed in three years from the date of the contract. If no production is obtained the government is not obligated to compensate the other contracting party if payments are to be made in oil. If payments are to be made in cash, then this cash is payable only when the work has been completed to the satisfaction of the government.

Upon the termination of any contract all fixtures or permanent installations pass to the government.

The contracts may be made only with: a) individual Mexicans; b) companies organized by Mexicans only; c) companies of "mixed economy"; d) companies which have not issued bearer shares.

It is clear therefore that foreigners may not directly nor may companies with foreign stockholders, contract under present laws for the development of oil, although they may purchase petroleum products.

A final type of contract provided in the existing law is called a contract of "mixed economy." This contract is based on a partnership or association or participation arrangement with the government wherein the government organizes a company and transfers subsoil rights and other property to it, and reserves the majority of the stock and the management of the company. Foreigners are prohibited from participating in this class of company although Mexican nationals could enter the arrangement by supplying money or technical skill and receiving the minority stock as their participation.

As yet we have seen no evidence of any contract of this kind.

Alemán Seeks Improvement

That local management of the expropriated properties has not been too successful is obvious from the fact that although the Pemex Company is expressly exempt from stamp and income taxes, and from inheritance or gift taxes, yet the price of petroleum products has increased, the quality has decreased, and especially gasoline has become scarce; the price of gasoline has greatly increased since 1937; financially Pemex has lost substantially since it has taken over the operation of the expropriated oil properties; and finally, taxes which would be paid the government by the oil companies with increased operations would be greatly in excess of the taxes now paid the government by Pemex.

President Alemán in an intelligent effort to better the Pemex situation has attempted and is now attempting to control labor and reduce overhead. He has put in charge of this company men of outstanding ability and honesty and has convinced labor that the path previously taken could lead only to disaster. However no new oil fields of consequence have been discovered and when the only large field (Poza Rica) shows salt water, which in time it must, Mexico will face a crisis of unequalled proportions. There is very little coal in Mexico and therefore the plan of industrialization must fail without oil. Since the end of the war, the urgent reasons for the United States

ABOUT THE AUTHOR

ROSCOE B. Gaither, author of the accompanying article, is a lawyer with wide experience in Latin American affairs. He is a member of the legal firm of Schuster, Flores and Gaither with offices in Mexico City; member of the New York Bar, the Association of the Bar of the City of New York, and of the Academia Mexicana de Legislacion y Jurisprudencia. For many years his practice has been principally in matters relative to oil properties in Mexico and South America. Born in Texas, he received his bachelor and law degrees from the University of Virginia, and did post-graduate work in civil law at the Sorbonne in Paris. Among his numerous writings on Mexican law is his book "Expropriation in Mexico." He served during the last war with the U. S. Army Intelligence Service, attaining the rank of colonel. He is now the Commander of the Alan Seeger Post No. 2 of the American Legion and a member of outstanding clubs and groups, including the famed "Charro" organization.

to help Mexico in producing and refining oil must, of necessity, disappear. In fact there is strong agitation in the United States now for an increase in import tariff on Mexican oil.

In the history of Mexico there has never been a closer or finer feeling of neighborliness and good will between the two countries. Mexico realizes as never before, the need of development, and the consequent need of foreign capital. American discovery, development and production of oil and its products is unique, and has received world wide recognition. The period in which it might have been possible for capital to exploit a people has passed. The inevitable consequence of increased power vested in labor will be to create closer cooperation.

Role of Taxes

Mexico urgently needs an export balance. It can achieve this by discovery of new oil fields and by increased exportation of oil and its products. To encourage this development a tax readjustment is vital. At present the following taxes are paid:

A) Export tax:

1) On export of up to 635,930 cubic meters per year of fuel or crude oil, 10 percent of its value; above 635,930, 24 percent of its value.

2) Gasoline, refined, 2 percent of its value, ranging down to $2.50 Mexican currency per ton of asphalt.

Petroleum, or its products, used in Mexico, is exempt from this tax.

B) Production or stamp tax:

1) Ten percent ad valorem per net ton for fuel or crude oil.

2) Gasoline, refined, one half centavo per liter down to $1.50 Mexican currency per ton of asphalt.

Petroleum, or its products, used in Mexico, is similarly exempt from these production taxes.

In addition there are documentary taxes, property taxes, concession and sales taxes, and an income tax up to 30 percent of the net profits, and a tax on royalty of up to 41.5 percent.

Until Mexico is assured of an adequate supply of gasoline and other petroleum products it is natural that export penalties should be placed on oil, crude or refined. When oil is discovered in sufficient quantities to justify exports, Mexico will undoubtedly take steps to facilitate the exportation of oil to aid its export balance.

In order to permit, again, investment of foreign capital in the petroleum industry there is no need to amend the constitution of Mexico. The oil law and the regulation could be changed by a few words without violating the constitutional terms and thus accomplish the purpose of freely permitting the oil companies to return to a friendly Mexico.

Former Union Oil Man Now Petroleum Attache

Don L. Sullivan, formerly with the Union Oil Company, is the petroleum attache of the United States legation at Cairo, Egypt.

Don Sullivan

Two United States companies — Standard Oil Company of Egypt (Standard of Jersey) and Socony-Vacuum Oil Company — are actively engaged in development of Egyptian oil resources. Both companies drilled wildcat tests in 1946 with a joint venture between Socony-Vacuum and Anglo-Egyptian Oilfields, Ltd. (Shell group), opening a new producing area.

Iraq to Pay the Lebanese For Pipe Line Protection

Iraq Petroleum Company has agreed to pay the Lebanese Republic 45,000 pounds sterling (about $180,000) yearly for protection to the company's pipe line terminating at Tripoli.

During French occupation of Lebanon, IPC incurred no such obligations because of French participation in its management. With the withdrawal of the French, however, Lebanese officials suggested IPC assume the financial obligation of protection to its property.

The 45,000 pounds sterling figure was arrived at by matching the sum agreed on by Lebanon and Trans-Arabian Pipe Line Company. Trans-Arabian, however, broke its payment down into 25,0000 pounds sterling (about $100,000) protection plus a ton rate on all oil moved through the prospective line, with a minimum guarantee of 20,000 pounds sterling (about $80,000) per year.

Intensive Exploration Plan Of Two Australian Companies

Vacuum Oil Company, Ltd., Australian subsidiary of Standard Vacuum Oil Company, has joined with D'arcy Exploration Company and Zinc Corporation, Ltd., in formation of two new Australian companies for an intensive exploration campaign in Australia. Vacuum geologists state that past geological and geophysical work has been inconclusive and plan a new program using latest methods and equipment.

A gravity meter crew is en route to start work in a large area including parts of South Australia, Queensland and New South Wales to be operated by Frome-Broken Hill Company, one of the new firms. The other new company Bonaparte Gulf Company, Ltd., will investigate the Northern Territory and Western Australia. Dr. Frank Reeves, who has already arrived in Melbourne from the United States, will direct preliminary aerial and surface geological reconnaissance. Dr. Robert Suave, who has had experience with Standard Vacuum in the Netherlands' East Indies, will coordinate exploratory work of both companies.

The program has been developed in close cooperation with the Australian government. The new firms will be owned one third each by the three principals. D'Arcy is a subsidiary of Anglo-Iranian Oil Company, Ltd.

Pressure at St. Marcet Field Given at 2000 Psi

Gas pressure in the St. Marcet field, southern France, is 2000 psi and not 200 psi as stated in the February 3 issue of THE OIL WEEKLY. This error was pointed out by Edward D. Lynton, of the Institute du Petrole.

During 1946, 14 wells were completed in the St. Marcet field—two oil wells, nine gas wells and three dry holes. Total footage drilled was 90,760 feet. At the end of the year one rig was active and 14 shut down.

Gas production in the field during 1946 totaled 3880 million cubic feet while the oil output was 930 barrels.

International Oil School Planned by Co-Operatives

An international school for study of petroleum production, processing and distribution will be held in Kansas City, probably in August and September, Howard A. Cowden, secretary of the International Cooperative Petroleum Association, which will sponsor the course, has announced. Representatives from each of about 15 countries, whose cooperatives have expressed a desire to help develop the ICPA, will attend.

Articles and by-laws are being mailed in preparation for a meeting shortly of the temporary board of directors named at Zurich, Switzerland, last fall. ICPA will become a coporate entity, probably at the next meeting of the directors, and will begin business as a broker but in time will enter every phase of the petroleum industry, Cowden anticipated.

Trustees of the Freedom Fund recently voted to provide scholarships at the ICPA school for one student from each of the war-torn countries. The Freedom Fund was raised by U. S. cooperatives during the war for the relief and rehabilitation of cooperatives in war-ravaged countries.

Agreement Recently Signed May Be Signal for Renewed N.E.I. Activities

The most encouraging event regarding possible early resumption of full-scale activity in The Netherlands East Indies was the recent signing of the "Lingaar-Djati Agreement" between members of the Indonesian cabinet and representatives of the Dutch Commission General. In the opinion of the Dutch press the signing of the agreement will permit early opening of the area to prewar activity. Within a short time it is hoped that all foreign industry operators as well as the oil industry will be able to get back to their properties for rehabilitation.

The agreement was decided upon in principle in October, 1946, after lengthy discussions, and a pact was worked up in tentative form which was ratified in Holland and referred to the Indonesian National Congress. At the end of its meeting just before March 1, although it had taken no group action the congress passed a resolution of confidence in the policy of the Indonesian government with reference to negotiations with the Dutch Commission.

Actually it remains to be seen to what extent the government leaders are in a position to speak for the people. There are still factions actively resisting the new set-up's policy toward foreigners, and militantly nationalistic toward any political intervention or collaboration.

It is hoped by representatives of the oil industry, that delay in final signing of the pact was for the purpose of sounding out the general situation, and that before signing, the Indonesians had satisfied themselves of the support of the majority of the people.

Thus far, industry is still in the dark regarding actual condition of fields, pipe lines, and other installations outside of the refineries. Reports from the field have been second-hand, and at least one of the major operators in the East Indies has yet to succeed in getting any of its people into the producing areas for a survey of damage and for making estimates of the extent to which producing capacity has been impaired.

Kuwait's 1946 Output

Kuwait crude production last year amounted to 5,931,000 barrels, of which 5,713,372 barrels were exported during the year, chiefly to Palestine and Scotland, it is reported by the Department of Commerce. December production was at the rate of 33,000 barrels daily from Kuwait Oil Company's eight wells.

Company operations were handicapped in 1946 by shortage of personnel and supplies, but it is generally expected to expand during the next four years into one of the largest producers of crude in the Middle East.

Hubbard to Kuwait

Paul Hubbard of Houston, assistant superintendent of production for Gulf Oil Corporation, will leave shortly for Kuwait to relieve Tom Patrick as general agent for Kuwait Oil Company. Mrs. Hubbard will accompany her husband.

French Morocco Production Slightly Under 1945 Mark

Crude oil production in French Morocco amounted to 19,700 barrels during 1946 as compared with 23,603 barrels in 1945. Cumulative production in the country's three producing areas through 1946 was 317,000 barrels.

Production by fields in 1946 was: Tselfat, 4500 barrels, Ain-Hamra, 8200 barrels, and Bou Draa, 7000 barrels. Only drilling in proven fields was the completion of three oil wells at Ain-Hamra with a total footage of 2550 feet. However, 16 wildcat tests, drilled to a total of 40,340 feet, were completed as dry holes. At the end of 1946, three wildcat rigs were in operation in French Morocco.

Meanwhile, Societe Cherifienne des Petroles has started its exploration program in the Rharb basin after being delayed by the war. This program includes purchase in the U. S. of equipment to replace 10-year old drilling rigs.

Oil Congress Delay

The first South American Oil Congress, scheduled in Lima, Peru, on May 12-17, has been postponed indefinitely.

Decision to postpone was charged to acute shortage of hotel accommodations but THE OIL WEEKLY learned that perhaps more potent factors were: 1) to give more time to interest all South American countries in the meeting; 2) the conflicting proposals of American oil interests, and 3) the determined drive by the Argentine government to impose its ideas regarding government-controlled oil fields in Chile, Peru and Bolivia.

Hungary 1946 Production Gains Slightly Over 1945

Crude oil production in Hungary during 1946 totaled 5,145,342 barrels, a slight increase over the 5,020,695 barrels produced in 1945.

The principal area in Hungary is the Lovaszi field which produced 3,029,931 barrels in 1946. Budafapuszta field produced 1,562,712 barrels and Hahot, 552,699 barrels.

It is not likely that any increase in production will be made in 1947, since the Budafapuszta field is considered completely developed and the Lovaszi field failed to increase its production for the year though 12 producing wells were completed.

At the close of the year, 24 of the 79 wells on production at Lovaszi were being operated on artificial lift. Of 75 wells now producing at Budafapuszta, 36 are pumping and 39 flowing.

The Hahot field, a 1942-discovery, rereceived some development during the year with three wells drilled, but all three were gas producers. The field has five oil producing wells.

The country's 10 small refineries are reported in operation again. Total combined capacity of the 10 refineries is 14,540 barrels per day, 350 barrels of which is cracking capacity.

Canadian Plants Handle More Oil, U. S. Imports Up

Canadian refineries last year received 70,333,514 barrels of crude as compared with 65,691,977 barrels in 1945, but the amount obtained from Canadian fields declined to 6,990,742 barrels from 7,696,659 barrels and the receipts from the United States increased to 37,020,595 barrels from 32,424,624 barrels, according to a Department of Commerce report.

Crude receipts from Venezuela also increased, to 21,800,293 barrels from 16,043,924 barrels, but those from Colombia dropped to 4,228,644 barrels from 8,374,214 barrels.

Tunisia Exploration

Syndicat d'Etudes de Recherches Petrolieres plans a serious exploratory campa'gn in Tunisia during 1947 and will place in operation two 10,000-foot rotary rigs which have been purchased in the United States.

From 1931 until 1944, the Syndicat drilled 11 wildcat tests in Tunisia totaling 34,440 feet on seven structures.

Wildcats in Both Eastern and Western Venezuela Holding Particular Interest

One of the most interesting wildcats is a deep test being drilled by Compania Consolidada de Petrolea, a Sinclair affiliate, north of the Santa Barbara field in Eastern Venezuela. This well, the company's SBN-127, recently set a string of 7-inch casing at 10,080 feet. Little information has been released but it is understood that at this depth the well has cut some 80 feet of pay with good oil showings believed to be in the Cretaceous limestone. Tests are being made.

Production from the Cretaceous at this point is of extreme interest to many operators in Eastern Venezuela, since it is in a locality 10 or 12 miles north of the production in the Jusepin-Mulata-Travieso fields which constitute one of the principal sources of Eastern Venezuela production. Much recent exploratory work has been along the trend running roughly east and west in a belt several miles north of the producing fields, production from the deeper formations below the Miocene section being sought. Cretaceous production as prolific as in extreme Western Venezuela would be extremely important.

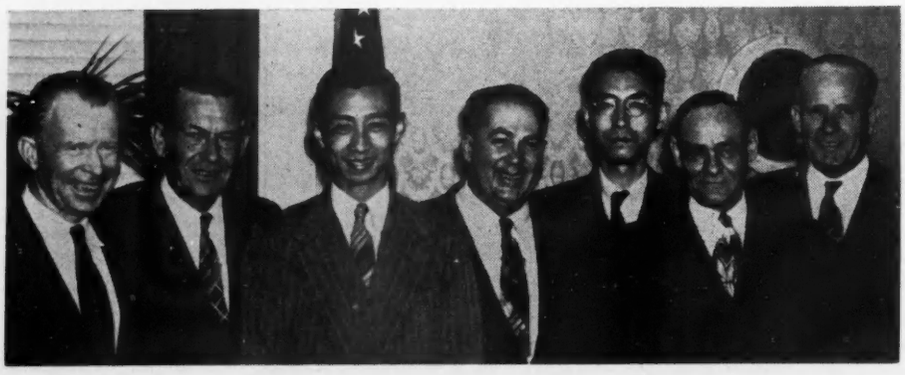
In Western Venezuela, Venezuelan Oil Concessions' VL-2, deep wildcat in the middle of Lake Maracaibo, has been found to be into the Upper Cretaceous formations at its current drilling depth just below 11,000 feet. This would apparently indicate an uplift of considerable relief in the lake, since deep wells drilled on the east shore have found only Eocene to as far down as 15,106 feet. Creole Petroleum Corporation had drilled 5 wildcat tests in the lake during 1946, most of which were only taken to depths around 8000 feet. These wildcats are on the suspended list, having been so drilled that they can be carried deeper at any later date.

To the west of the lake, Richmond Exploration Company's Zulia 26-1, most southwesterly of the company's group of wildcats drilled to test its huge acreage, was reported to have found evidences to warrant setting a long string of 5½-inch casing to 10,548 feet, after drilling to 11,540 feet. This well is a test on a trend which might be expected to find the Lower Cretaceous.

Farther south on the same trend, and west of Las Manueles-Tarra fields, Colon Development Company's wildcat, WT-2, was in a sidetracked hole below 8300 feet after giving up on a fishing job. The well had already shown enough oil on a drill-stem test to assure a large producer from the Cretaceous, but is going ahead to the basement for a thorough test of the formation.

The Shell group's Curacao 2-A, deepest test outside the United States, was still standing at 15,106 feet at latest report, and had a string of casing to 13,169. Showings near the bottom of the casing will be tested. Operators are waiting for special equipment.

Internationalists Visit With Nomads



International guests at the March meeting of the Los Angeles Chapter Nomads are shown, left to right, above as follows: Robey H. Deem, Shell interests, Colombia; G. F. Harvey, Iraq Petroleum Company; C. K. Suez, Chinese Petroleum Corporation; Charles W. LaMar, Barnsdall Oil Company, Venezuela S. J. Liu, Chinese Petroleum Corporation; O. H. Shelton, Standard Oil Company (New Jersey), Venezuela; and Harry D. Huskey, Iraq Petroleum Company.

Colombia's January Output Tops Two Million Barrels

Crude oil production in Colombia during January totaled 2,109,763 barrels. Tropical Oil Company's output was 1,081,949 barrels from several fields, as follows: La Cira, 817,371 barrels; Infantas, 254,388 barrels; Colorado, 9136 barrels, and Galan 1053 barrels.

Colombian Petroleum Company's production was 647,007 barrels. Petrolea field accounted for 294,468 barrels and Tibu, 362,539 barrels.

Production of the Compania Colombiana de Petroleo el Condor in the Casabe field was 380,808 barrels.

Meanwhile, Texas Petroleum Company has spudded a new test in the Guaguaqui-Teran area and its Velaquez was drilling near 3000 feet.

Colombian Gulf Oil Company's Sardinata 1, Sardinata concession, was abandoned at 81994 feet.

Sociedad de Fomento Petrolero's La Salina 2, Las Monas concession, is a producer at 3516 feet.

Need for Foreign Company Aid Recognized in Bolivia

Abandonment of the nationalization policy adopted by Bolivia when it excluded foreign oil companies in 1936, first indicated by the granting of a concession to an American company to drill 50 wells in the Camiri fields, is expected to be formalized by the next Congress in legislation being prepared which will make provision for foreign concerns to enter the field of petroleum production, according to Department of Commerce.

Following nationalization of the industry and expropriation of American-owned properties in 1936, oil production was placed under the administration of a government corporation. The job, however, proved too great for Bolivia's limited financial resources, and the present trend recognizes that the assistance and capital of foreign companies is essential to the development of reserves.

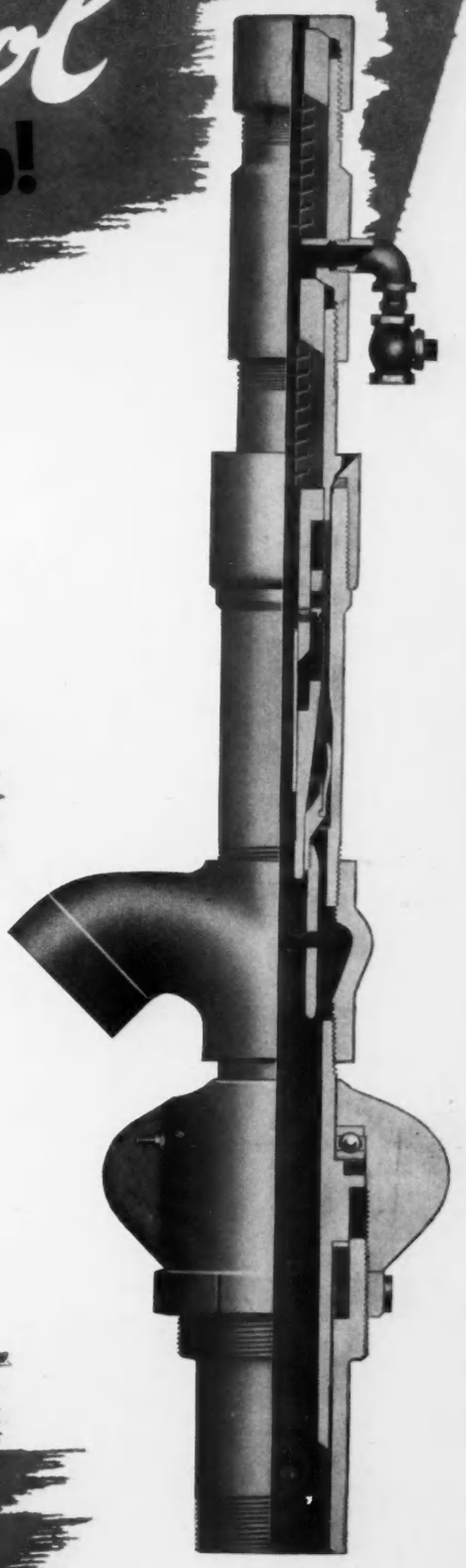
Bahamas Island Test

The wildcat test by Bahamas Oil Company, Ltd. (Superior Oil Company of California) on Andros Island in the Bahamas is drilling below 13,000 feet. Whether any shows have been encountered has not been revealed. This is the only active test in the Bahama Islands.

Meantime, Bahamas Oil Exploration Company, Ltd. (Gulf) is preparing to start aerial magnetometer survey on its 3676 square mile concession.

ONE PRESSURE CONTROL useful for every wire line job!

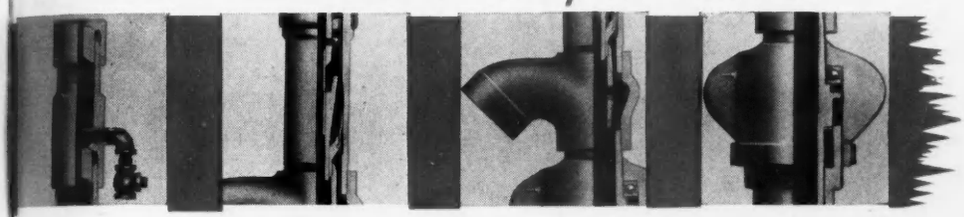
Pressure Control



HERE'S the tool that gives you all the advantages of a poor-boy swivel for rotating pipe and circulating to keep the well under control . . . and on top of that gives a pressure-proof wire line pack-off to hold gas and oil inside the flow lines. *It's the Bowen Pressure Control!*

With this one compact unit you can run wire line core barrels and surveying instruments under pressure — *with safety* — swab for production tests, keep the pipe free, maintain circulation and have a dry and *safe* rig floor. You have in one tool all the safety and operating convenience you normally get only by combining several individual tools!

4 RUGGED PARTS INSURE *Complete Control*



1 2 3 4

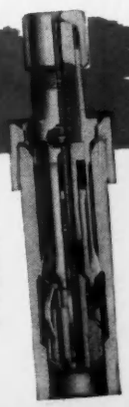
1. This *Packing Unit* on the Bowen Pressure Control prevents gas or fluid leakage and wipes the line clean as a whistle. It automatically locks in position when tools are lowered in the hole, and automatically releases when struck by outcoming tools.

2. See that *Automatic Lock?* It snaps into position as the tools are lowered, *and no amount of pressure can blow it out.* Yet when struck by the rope socket it releases the packing unit *instantly.* Eliminates need for flagging the line — speeds your operations.

3. With this *Gooseneck Connection,* you can attach the regular rotary hose and keep up circulation to prevent pipe sticking. Takes any pressure you need for control, and doesn't choke back the flow!

4. This lubricated ball-bearing *Swivel* permits full rotation of the drilling string to further prevent freezing the pipe. It rotates with the table while the Gooseneck Connection above remains stationary — and circulation is continued for proper well control.

Use the Bowen Pressure Control in your production work—wherever you want maximum well control during wire line operations. Available in sizes to fit your drilling string. Sold outright for export only.



FOR PACKING OFF WIRE LINES

. . . when the circulating swivel and high pressure extension described above are not required, the Bowen Line Wiper shown at right is the ideal tool. It is a completely automatic unit that keeps the wire line clean, prevents gas or fluid leakage and maintains a dry and safe rig floor. Pressure-proof . . . fully automatic locking and releasing action . . . simple, sturdy and safe. Available from Bowen headquarters in your territory—sold outright for export only.

BOWEN CO

MAIN OFFICE AND PLANT:
2752 NORTH NORWALK BOULEVARD
SANTA FE SPRINGS, CALIFORNIA

EXPORT OFFICE:
30 ROCKEFELLER PLAZA
NEW YORK CITY, NEW YORK

EXPORT REPRESENTATIVE: VAL. R. WITTICH, JR.

PROBLEM

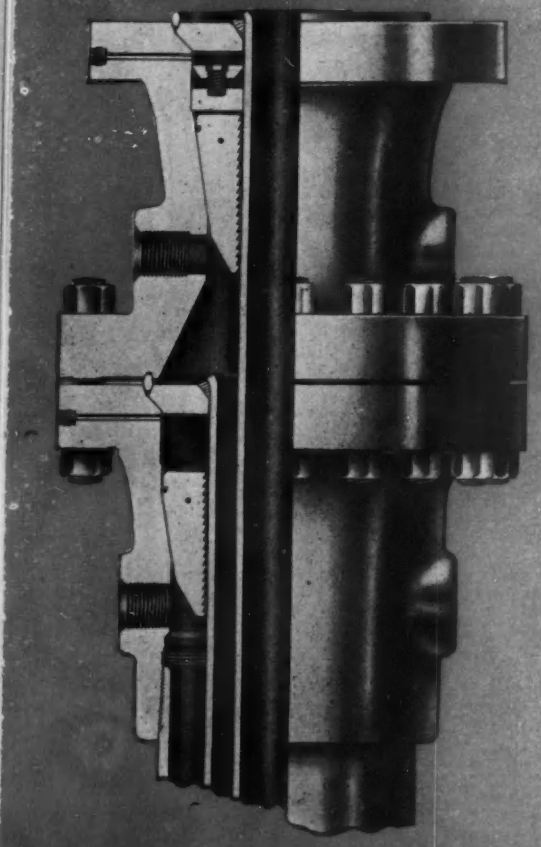
To make safe, permanent seals in Refineries; Natural Gas and Gasoline Plants; Butane-Propane Plants; Pipe Lines; Chemical Plants.

SOLUTION:

Welding

And in RECTORHEADS! too...

WELDING ASSURES SAFE, PERMANENT SEALS!



WE ARE applying to well heads what operators in other branches of the industry learned long ago; namely, welded seals are unsurpassed for safety and permanence.

The RECTORHEAD welded casing head seal is made quickly and easily. The patented floating welding ring (much smaller than the conventional bulky welding flange) is easily heated at the same rate as the pipe. No strain or distortion is applied to ring or weld, during or after welding. STRESS RELIEVING IS NOT REQUIRED.

RECTORHEAD welded casing head seal has no resilient packing. It is a seal that will not deteriorate; will not burn out in case of fire; will not disintegrate under the action of anti-corrosive chemicals being used in so many wells. The permanent, leak-proof safety of RECTORHEADS prevents pressure equalization; eliminates the costly job of replacing well head packing; permanently protects your well investment.

Be safe! . . . Specify RECTORHEADS on all your wells.

RECTOR WELL EQUIPMENT CO., Inc.

FT. WORTH NAT'L. BANK BLDG., FT. WORTH, TEXAS

PLANTS: Fort Worth & Houston, Texas
Representatives in All Active Fields
Export: Lucey Export Corp., Woolworth Bldg., N. Y. C.

RECTOR

RECTORHEAD

MAKING THE OIL INDUSTRY SAFER!

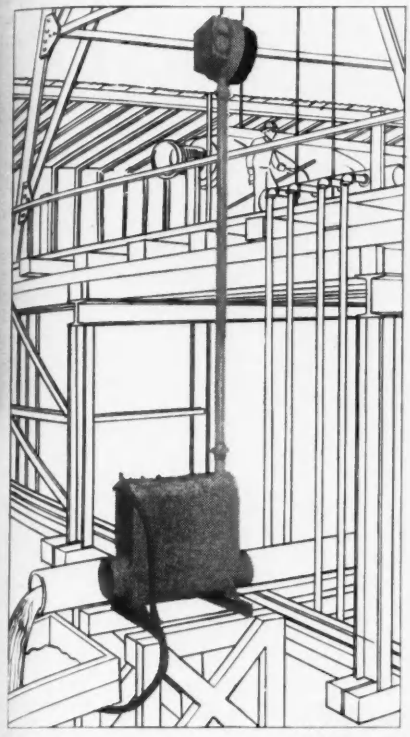
ASSOCIATION OF WELL HEAD EQUIPMENT MANUFACTURERS CERTIFIED

NEW EQUIPMENT
LITERATURE

FOR ADDITIONAL INFORMATION, USE MAILING CARD INSERTED OPPOSITE THIS PAGE

1—Mud Circulation Indicator

A mud circulation rate indicator is designed to measure the fluctuations in rate of flow of drilling fluid as it is returned from the well. These variations in rate of flow are said to be accurately



correlated with pressure fluctuations resulting from the penetration of a gas sand, water flow, drill pipe washouts, loss of circulation and any other factor which tends to increase or decrease the rate of fluid circulation.

The flow variations are continuously recorded and mechanically indicated and may be observed constantly by the driller on the derrick floor as illustrated. An alarm bell also is provided to warn the driller of any unusual happening in the hole. Thus forewarned, the driller can take the necessary remedial steps to avoid a blowout, twistoff, continued loss of returns, etc.

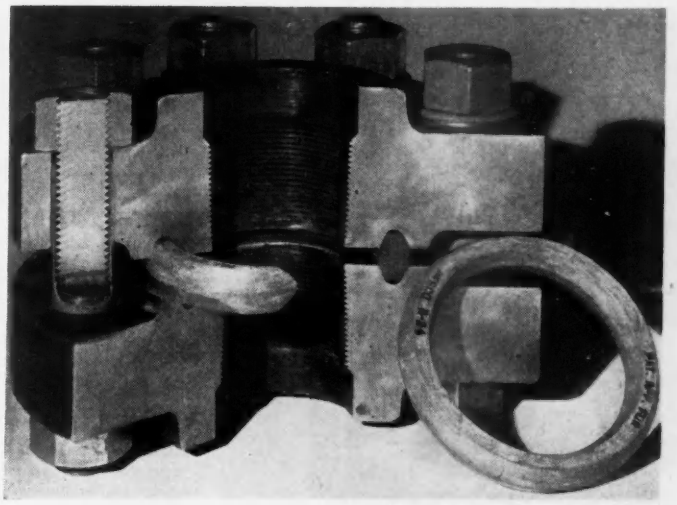
The principle of the Rate-Of-Circulation indicator is as follows: Under a given pump pressure, drilling fluid rises to a predetermined level in the drilling control assembly, a point usually several inches above the flow line connection. This static head of fluid pressure controls the pressure on the flow line. Variations in the static head affect the rate of flow of fluid from the well, such variations being the result of one or more of the aforementioned factors. To detect these fluctuations in rate of flow, a small reservoir is placed in the discharge flow line and a fluid level is consequently established.

According to the manufacturer, the instrument is easy to install and operate, requiring only the changing of a chart at the end of every 24 hours of operation. All moving parts are stainless steel and monel metal and are, therefore, not affected by corrosive or acid muds. The equipment is available on a monthly or annual rental basis in domestic fields or may be purchased outright for export.

A. L. Smith, 4601 Montrose Boulevard, Houston.

(Check item 1 on postcard for more information.)

2—Fiberglas-Plastic Gasket



A fiberglas-plastic ring seal gasket, designed to help solve oil and gas well corrosion problems, is available in all standard sizes. It is a high-strength, high-dielectric laminate consisting of plies of fiberglas cloth inpregnated with a phenolic resin, and precision molded under high pressure and temperature.

The high dielectric strength of the gasket makes it possible, by using it in ring sealed joints, to provide insulation against the stray and long line electrical currents that flow from the connecting pipe line system into the uninsulated well structure. Such currents frequently destroy the outsides of well casings at the rate of 20 pounds of metal per ampere year.

Another important function of the fiberglas-plastic gasket is to eliminate corrosion at the joint, caused by the active galvanic cell set up at the joint by dissimilar metals (a metal ring gasket and the flange metal) in the presence of a low-resistance electrolyte. Such galvanic corrosion is particularly severe in high-pressure gas condensate well structures.

The "Pesco" ring seal gasket is designed to stand rough handling in the field and still make a perfect joint. It can be reused without being remachined.

The fiberglas-plastic gasket has a flat compression strength of 66,245 pounds per square inch, an edge compression strength of 15,757 pounds per square inch, and tensile strength of 48,272 pounds per square inch. Temperature limit is 480° F. The gasket is unaffected chemically by any of the gases and fluids encountered in the production and transmission of oil and natural gas.

Plastic Engineering and Sales Corporation, Fort Worth.

(Check item 2 on postcard for more information.)

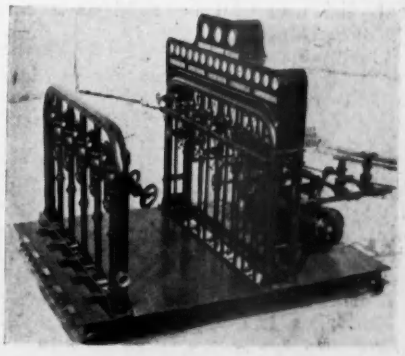
3—Boiler Firing System

A complete firing system for oil field boilers has been developed and unitized. Employing forced draft, and forced-feed fuel injection, the boilers are fired from one central manifold, through a system of gauges and valves which control all water, fuel and draft for each boiler. The forced draft firing systems consist of specially designed forced draft burners, heavily insulated duck's nests, pressure-tight boiler doors, turbine-driven forced-feed fuel pumps and an instrument panel or control manifold for each set of boilers. These firing systems obtain maximum energy from all fuel consumed, through improved combustion, uniform firebox temperature and by retaining all heat inside the firebox through use of sealed doors. Stack blowers and steam jets are completely eliminated, thus reducing the amount of steam required from each boiler, which in turn reduces the amount of water and fuel required. Flue warping and scaling also are reduced materially through elimination of cold drafts in the firebox.

The photograph illustrates a control manifold for five boilers, all of which may be fired through the manifold. Individual controls are furnished for each boiler.

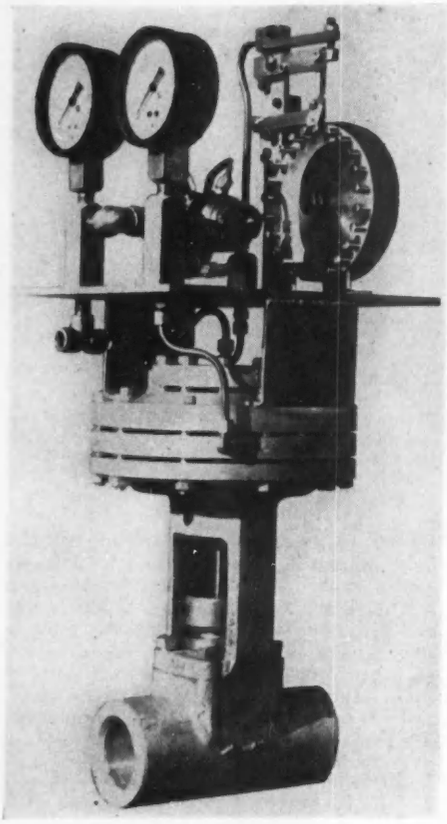
Owen Tool Company, 18th Street Extension, Houston.

(Check item 3 on postcard for more information.)



4—Surface Controller

The new type "AP" surface controller embodies a new design and construction for intermittent gas lift operations. Combining regulation with time cycle control, this unit operates as a regulator



when the valve is open, thereby using only sufficient gas to complete an injection cycle with the lowest possible gas-oil ratio. By adjusting the pilot pressure, the unit can be made to operate as a straight time cycle controller.

When the injection cycle starts and the desired casing pressure buildup is reached, the unit, acting as a regulator, closes the valve, independent of the time cycle unit, and holds the casing pressure constant until the time cycle unit closes.

By removing the time cycle unit and adapting the pilot pressure regulator to the valve body assembly, the unit can be used as a gas pressure regulator. The valve can be operated from the bottom or top of the valve seat. Adapting the unit as a gas pressure regulator and placing the valve on top of the valve seat, the unit can be used as a back pressure valve.

The unit can be used as a stop-cocking unit with an exceptionally large capacity valve. It can be adapted to operate either as a direct or indirect operating valve. An added feature is the design of the valve seat. The seat is not threaded into the valve body and there is no pressure on the yoke-valve body joint. Removal of the four yoke bolts gives acess to the entire valve working parts.

Merla Tool Corporation, P. O. Box 2576, Dallas 1.

(Check item 4 on postcard for more information.)

5—Cable Tool Bit

The H-P Hialloy cable tool drilling bit is forged from a new and superior bit steel material, according to the manufacturers, and was developed through many years' experience in producing cable tool bits, plus extensive research and experimentation.

Actual field use of the H-P Hialloy drilling bit, under severe drilling conditions, is said to prove itself to be outstanding in abrasion resistant and shock-absorbing qualities. It is reported that extra footage drilled per bit dressing has resulted, plus trouble-free performance. It is available now in sizes up to ten inches.

Hinderliter Tool Company, Tulsa.

(Check item 5 on postcard for more information.)

6—Forged Flow Wing Valve

Recently introduced is the new type "F" flow wing designed for 3000 pounds working pressures. It provides in a single compact unit an adjustable or positive flow bean plus a wing valve for choke changing. Illustrated in three-quarter section is the flow wing fitted with an adjustable choke and with a positive choke.

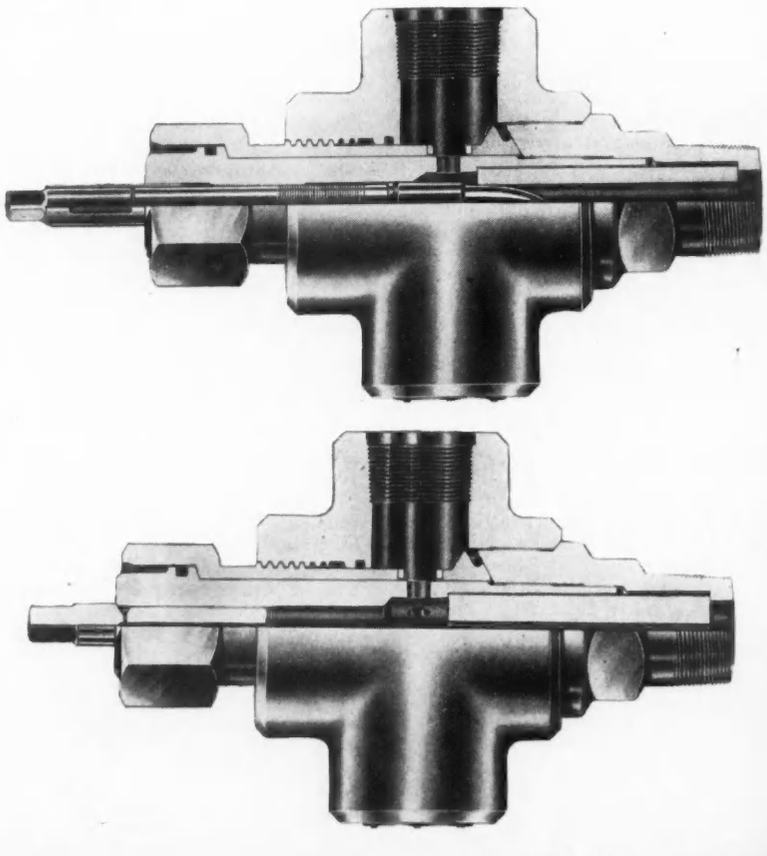
The valve section of the unit is shown in open position. It is closed by screwing the valve down to its seat, using an all-purpose wrench which fits the hex on the valve stem. A coarse thread is provided between the valve stem and body for speedy opening and closing of the valve. The valve and its seat are faced with hard metal to resist cutting. Both the valve and seat, as well as all other parts of the unit, are readily replaceable without removing the unit from the well.

The bean retainer, which screws inside of the valve stem, may be removed easily when it is necessary to replace beans, utilizing the same wrench as above. As a safety measure, the wrench cannot be fitted to the bean retainer unless the valve is in closed position. An indicator plate, graduated in increments of 1/64 inch, is provided to facilitate adjustment of the choke to meet production requirements. The all-purpose wrench also fits the adjustable choke stem.

The Tye "F" flow-wing may be converted from an adjustable choke to a positive choke type. This conversion may be accomplished in the feld by simply substituting a plug for the adjustable choke stem and installing a flow bean of the desired size. It is available in studded body models or threaded as shown.

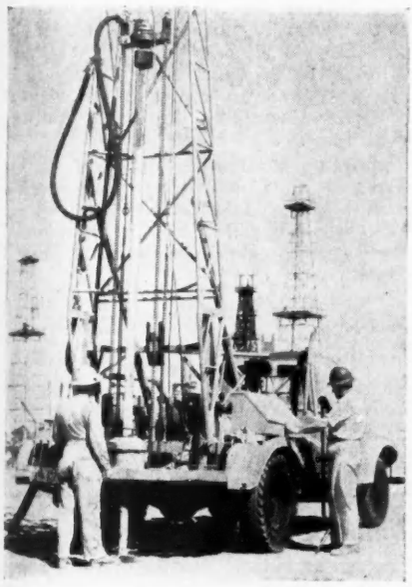
Cameron Iron Works, Inc., Houston.

(Check item 6 on postcard for more information.)



7—Geophysical Rig

Production of a self-lubricated, completely sealed portable drilling unit was announced recently. Of particular interest is that no lubrication is necessary on any functional part of the unit with the



exception of the pull-down shaft and swivel packing. Successfully developed for use in exploration work, the Model "1000" is now available for drilling shot holes, shallow oil and gas wells, water wells, disposal wells and other drilling operations.

The unit is mounted on a 1½-ton truck with a hydraulically raised 50,000-pound capacity tubular steel mast. All power is from the truck engine to a power takeoff and then transmitted through a central power unit to a three-speed rotary table transmission, a double-drum winch and a 4½ x 6-inch duplex pump and pull-down unit. All parts are designed so that engine will stall before any part will break. Every functional part of the unit including swivel bearings feature dustproof sealed oil bath lubrication and require no maintenance regardless of operating conditions. The rig is particularly recommended for hot, dusty corrosive areas where lubrication may present a problem.

The Model "1000" is rated at 1000 feet with a 3 x 3-inch square kelly 14 feet long, handling 2⅜-inch drill pipe and 6½-inch bit. Holes up to 1500 feet have been drilled successfully.

Western Geophysical Company, 601 W. 5th Street, Los Angeles 13.

(Check item 7 on postcard for more information.)

8—Corrosion Preventatives

The development of a new class of reagents for the prevention of corrosion in oil and gas well equipment has been announced. Called "Kentol Corrosion Preventatives," these inhibitors have been shown by laboratory and field tests to be effective in materially reducing corrosion in both pumping and high-pressure condensate wells.

Recent experience indicates that with wells produced at pressures above 1500 pounds per square inch and at reservoir temperatures above 160° F., corrosion may be serious if more than 0.2 percent of CO_2 by volume is present.

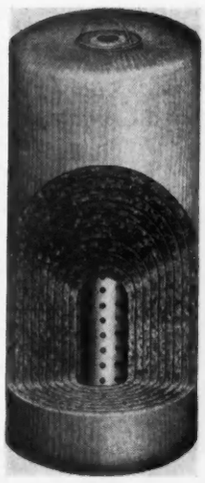
Kentol 115 is said to be a non-toxic, oil soluble, nearly odorless liquid which readily lends itself to well treatment. Manufacturers claim there is no tendency toward plugging of either the formation or well tubing by its use, since Kentol 115 does not show any reaction with salts carried by the brine, nor does it raise the pH of the brine with the possible resultant deposition of calcium or magnesium scale. Although oil soluble, Kentol 115 is surface active and builds up a thin film on the metal surface which protects the metal from corrosive elements in either the brine or condensate. Since it is a concentrated inhibitor, only small volumes are said to be required to maintain this film.

Tretolite Company, Webster Grove, St. Louis 19.

(Check item 8 on postcard for more information.)

9—Oil Filter

An oil filter element is being manufactured which consists of lint-free textiles wrapped in a closely-knit muslin, pressure wound in convolutions around a perforated metal core, and covered with a heavy tubing or muslin jacket. The horizontal flow of oil from outside to inside through the laminated construction materially increases dirt and sludge removal. As elements absorb contaminants they expand, allowing greater dirt storage capacity and higher saturation point.



These new filters will not rob oils of their valuable additives, it is claimed. They may be used with any type of oil, regardless of its use or application. Replacement elements are available in 260 sizes to fit all popular makes of filter cases. No adapters, springs, spacers or liners are necessary to make them fit, the manufacturer states.

Engine-Life Products Corporation, El Monte, Calif.

(Check item 9 on postcard for more information.)

Literature

10—Temperature Control

"Engineering, Operating and Maintenance Data on Temperature Regulators and Controllers" is the title of a booklet just released. Construction details of each class or type of regulator or controller are shown in detail in large cross-sectional color illustrations that highlight many features . . . 800 Brinell hardened stainless steel main valves; corrosion resistant springs, hardened stainless steel cylinder liners and controlling valves; phosphor bronze and monel diaphrams. Both self-contained regulators and external-pilot-operated controllers are featured.

Included are sizing and capacity tables to guide the selection of the proper regulator or controller for specific applications. Instructions for installing, operating, dismantling, cleaning and assembling are presented in an easily-followed sequence.

Leslie Company, 167 Delafield Ave., Lyndhurst, N. J.

(Check item 10 on postcard for more information.)

11—Pumps

"The Hydropress Pump" is the title of a 12-page bulletin issued for those who have big pressure, low volume pumping jobs requiring maximum efficiency. In three colors throughout the 12 pages, this bulletin covers technical data, application pictures, cross section drawings of parts, operation and design features, dimensional sketches, assembly procedure. Pump sizes covered are 10, 12 and 15-inch, with capacities of 20 to 300 gallons per minute, and head range 55 to 250 feet per stage (to pressures of 5000 pounds per square inch).

Featured and illustrated is the unusual pump application at the rim of Arizona's Grand Canyon where four Hydropress Pumps lift water 3200 feet from the reservoir at Indian Garden Springs to supply the needs of Park and El Tovar Hotels on the canyon's rim.

Byron Jackson Company, Box 2017 Terminal Annex, Los Angeles 54.

(Check item 11 on postcard for more information.)

12—Topographic Surveys

"Aerial Surveys Aid Highway Location" describes how large areas can be surveyed from the air and topographic maps made from aerial photographs. The new publication is a symposium of articles by well-known highway officials describing how this type of contour map developed from aerial survey photographs has been used with savings in time and money. This aerial survey technique, known as the Brock Method, was used extensively is surveying plant sites before and during the war.

Aero Service Corporation, 236 E. Courtland St., Philadelphia 20.

(Check item 12 on postcard for more information.)

13—Packing Catalog

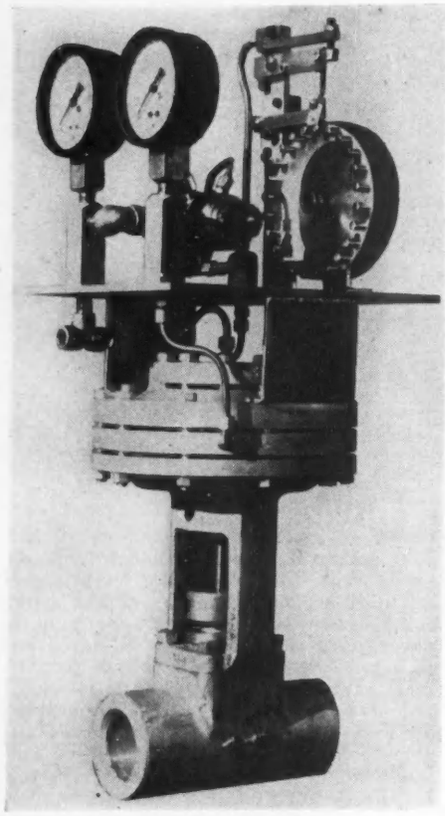
A 16-page condensed catalog, attractively printed in two colors, contains illustrations and descriptions of all the most popular styles of mechanical packings in the R/M line. Included is a recommendation chart showing the style numbers of packings recommended for practically every type of service.

Asbestos Textile & Packing Division, Raybestos-Manhattan, Inc., Manheim, Penn.

(Check item 13 on postcard for more information.)

4—Surface Controller

The new type "AP" surface controller embodies a new design and construction for intermittent gas lift operations. Combining regulation with time cycle control, this unit operates as a regulator



when the valve is open, thereby using only sufficient gas to complete an injection cycle with the lowest possible gas-oil ratio. By adjusting the pilot pressure, the unit can be made to operate as a straight time cycle controller.

When the injection cycle starts and the desired casing pressure buildup is reached, the unit, acting as a regulator, closes the valve, independent of the time cycle unit, and holds the casing pressure constant until the time cycle unit closes.

By removing the time cycle unit and adapting the pilot pressure regulator to the valve body assembly, the unit can be used as a gas pressure regulator. The valve can be operated from the bottom or top of the valve seat. Adapting the unit as a gas pressure regulator and placing the valve on top of the valve seat, the unit can be used as a back pressure valve.

The unit can be used as a stop-cocking unit with an exceptionally large capacity valve. It can be adapted to operate either as a direct or indirect operating valve. An added feature is the design of the valve seat. The seat is not threaded into the valve body and there is no pressure on the yoke-valve body joint. Removal of the four yoke bolts gives acess to the entire valve working parts.

Merla Tool Corporation, P. O. Box 2576, Dallas 1.

(Check item 4 on postcard for more information.)

5—Cable Tool Bit

The H-P Hialloy cable tool drilling bit is forged from a new and superior bit steel material, according to the manufacturers, and was developed through many years' experience in producing cable tool bits, plus extensive research and experimentation.

Actual field use of the H-P Hialloy drilling bit, under severe drilling conditions, is said to prove itself to be outstanding in abrasion resistant and shock-absorbing qualities. It is reported that extra footage drilled per bit dressing has resulted, plus trouble-free performance. It is available now in sizes up to ten inches.

Hinderliter Tool Company, Tulsa.

(Check item 5 on postcard for more information.)

6—Forged Flow Wing Valve

Recently introduced is the new type "F" flow wing designed for 3000 pounds working pressures. It provides in a single compact unit an adjustable or positive flow bean plus a wing valve for choke changing. Illustrated in three-quarter section is the flow wing fitted with an adjustable choke and with a positive choke.

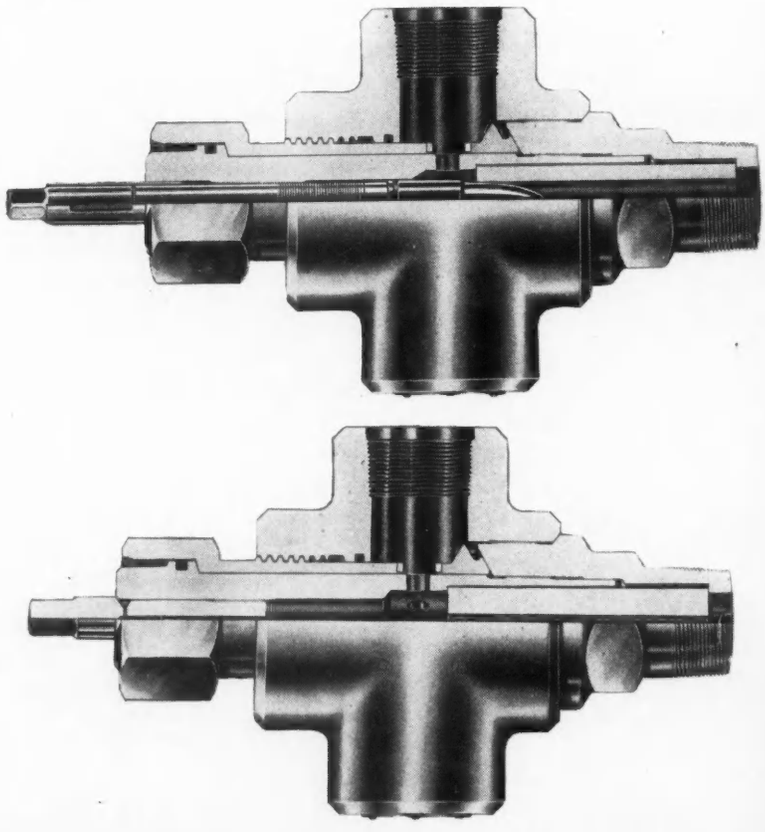
The valve section of the unit is shown in open position. It is closed by screwing the valve down to its seat, using an all-purpose wrench which fits the hex on the valve stem. A coarse thread is provided between the valve stem and body for speedy opening and closing of the valve. The valve and its seat are faced with hard metal to resist cutting. Both the valve and seat, as well as all other parts of the unit, are readily replaceable without removing the unit from the well.

The bean retainer, which screws inside of the valve stem, may be removed easily when it is necessary to replace beans, utilizing the same wrench as above. As a safety measure, the wrench cannot be fitted to the bean retainer unless the valve is in closed position. An indicator plate, graduated in increments of 1/64 inch, is provided to facilitate adjustment of the choke to meet production requirements. The all-purpose wrench also fits the adjustable choke stem.

The Tye "F" flow-wing may be converted from an adjustable choke to a positive choke type. This conversion may be accomplished in the feld by simply substituting a plug for the adjustable choke stem and installing a flow bean of the desired size. It is available in studded body models or threaded as shown.

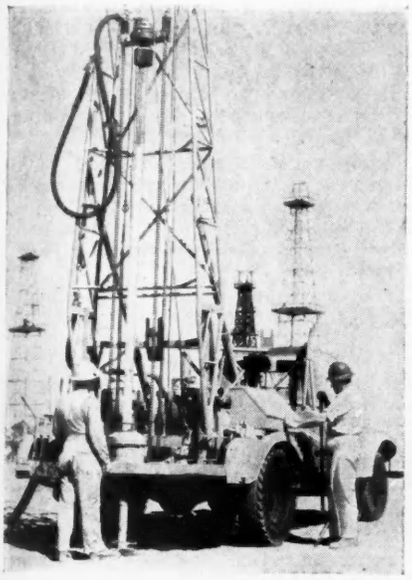
Cameron Iron Works, Inc., Houston.

(Check item 6 on postcard for more information.)



7—Geophysical Rig

Production of a self-lubricated, completely sealed portable drilling unit was announced recently. Of particular interest is that no lubrication is necessary on any functional part of the unit with the



exception of the pull-down shaft and swivel packing. Successfully developed for use in exploration work, the Model "1000" is now available for drilling shot holes, shallow oil and gas wells, water wells, disposal wells and other drilling operations.

The unit is mounted on a 1½-ton truck with a hydraulically raised 50,000-pound capacity tubular steel mast. All power is from the truck engine to a power takeoff and then transmitted through a central power unit to a three-speed rotary table transmission, a double-drum winch and a 4½ x 6-inch duplex pump and pull-down unit. All parts are designed so that engine will stall before any part will break. Every functional part of the unit including swivel bearings feature dustproof sealed oil bath lubrication and require no maintenance regardless of operating conditions. The rig is particularly recommended for hot, dusty corrosive areas where lubrication may present a problem.

The Model "1000" is rated at 1000 feet with a 3 x 3-inch square kelly 14 feet long, handling 2⅜-inch drill pipe and 6½-inch bit. Holes up to 1500 feet have been drilled successfully.

Western Geophysical Company, 601 W. 5th Street, Los Angeles 13.

(Check item 7 on postcard for more information.)

8—Corrosion Preventatives

The development of a new class of reagents for the prevention of corrosion in oil and gas well equipment has been announced. Called "Kentol Corrosion Preventatives," these inhibitors have been shown by laboratory and field tests to be effective in materially reducing corrosion in both pumping and high-pressure condensate wells.

Recent experience indicates that with wells produced at pressures above 1500 pounds per square inch and at reservoir temperatures above 160° F., corrosion may be serious if more than 0.2 percent of CO_2 by volume is present.

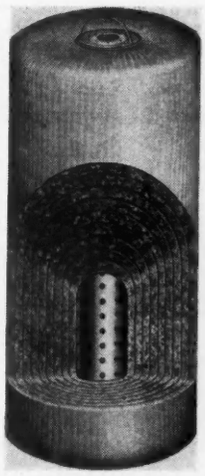
Kentol 115 is said to be a non-toxic, oil soluble, nearly odorless liquid which readily lends itself to well treatment. Manufacturers claim there is no tendency toward plugging of either the formation or well tubing by its use, since Kentol 115 does not show any reaction with salts carried by the brine, nor does it raise the pH of the brine with the possible resultant deposition of calcium or magnesium scale. Although oil soluble, Kentol 115 is surface active and builds up a thin film on the metal surface which protects the metal from corrosive elements in either the brine or condensate. Since it is a concentrated inhibitor, only small volumes are said to be required to maintain this film.

Tretolite Company, Webster Grove, St. Louis 19.

(Check item 8 on postcard for more information.)

9—Oil Filter

An oil filter element is being manufactured which consists of lint-free textiles wrapped in a closely-knit muslin, pressure wound in convolutions around a perforated metal core, and covered with a heavy tubing or muslin jacket. The horizontal flow of oil from outside to inside through the laminated construction materially increases dirt and sludge removal. As elements absorb contaminants they expand, allowing greater dirt storage capacity and higher saturation point.



These new filters will not rob oils of their valuable additives, it is claimed. They may be used with any type of oil, regardless of its use or application. Replacement elements are available in 260 sizes to fit all popular makes of filter cases. No adapters, springs, spacers or liners are necessary to make them fit, the manufacturer states.

Engine-Life Products Corporation, El Monte, Calif.

(Check item 9 on postcard for more information.)

Literature

10—Temperature Control

"Engineering, Operating and Maintenance Data on Temperature Regulators and Controllers" is the title of a booklet just released. Construction details of each class or type of regulator or controller are shown in detail in large cross-sectional color illustrations that highlight many features . . . 800 Brinell hardened stainless steel main valves; corrosion resistant springs, hardened stainless steel cylinder liners and controlling valves; phosphor bronze and monel diaphrams. Both self-contained regulators and external-pilot-operated controllers are featured.

Included are sizing and capacity tables to guide the selection of the proper regulator or controller for specific applications. Instructions for installing, operating, dismantling, cleaning and assembling are presented in an easily-followed sequence.

Leslie Company, 167 Delafield Ave., Lyndhurst, N. J.

(Check item 10 on postcard for more information.)

11—Pumps

"The Hydropress Pump" is the title of a 12-page bulletin issued for those who have big pressure, low volume pumping jobs requiring maximum efficiency. In three colors throughout the 12 pages, this bulletin covers technical data, application pictures, cross section drawings of parts, operation and design features, dimensional sketches, assembly procedure. Pump sizes covered are 10, 12 and 15-inch, with capacities of 20 to 300 gallons per minute, and head range 55 to 250 feet per stage (to pressures of 5000 pounds per square inch).

Featured and illustrated is the unusual pump application at the rim of Arizona's Grand Canyon where four Hydropress Pumps lift water 3200 feet from the reservoir at Indian Garden Springs to supply the needs of Park and El Tovar Hotels on the canyon's rim.

Byron Jackson Company, Box 2017 Terminal Annex, Los Angeles 54.

(Check item 11 on postcard for more information.)

12—Topographic Surveys

"Aerial Surveys Aid Highway Location" describes how large areas can be surveyed from the air and topographic maps made from aerial photographs. The new publication is a symposium of articles by well-known highway officials describing how this type of contour map developed from aerial survey photographs has been used with savings in time and money. This aerial survey technique, known as the Brock Method, was used extensively is surveying plant sites before and during the war.

Aero Service Corporation, 236 E. Courtland St., Philadelphia 20.

(Check item 12 on postcard for more information.)

13—Packing Catalog

A 16-page condensed catalog, attractively printed in two colors, contains illustrations and descriptions of all the most popular styles of mechanical packings in the R/M line. Included is a recommendation chart showing the style numbers of packings recommended for practically every type of service.

Asbestos Textile & Packing Division, Raybestos-Manhattan, Inc., Manheim, Penn.

(Check item 13 on postcard for more information.)

Stocks of Gasoline Continue Advance; Fuel Oil Demand and Output Balance

Gasoline stocks continued to advance during the week ended March 29, after making a false downward start in the previous week. Gasoline now on hand is within 2 million barrels of the all-time high reached shortly after the start of the war.

Warmer weather brought the turning point in fuel oil demand and the week's production and demand were very nearly in balance, resulting in little changes in stocks. These trends were revealed in the latest bulletin of The American Petroleum Institute.

Production of distillate fuel oil totaled 5,969,000 barrels in the week, or only 1000 barrels over the previous week's output, but was 473,000 barrels or 8.6 percent over that of the like week a year ago. Milder weather lessened the demand for distillate fuel during the period, when only 256,000 barrels were drawn from stocks compared with withdrawals averaging more than 1½ million barrels in past weeks. Stocks on March 29 totaled 32,737,000 barrels, which were 3,122,000 barrels or 10.5 percent higher than those in storage a year before.

Residual fuel oil output for the week amounted to 8,668,000 barrels to show an increase of 47,000 barrels over the past week's production and 76,000 barrels over the output of the like period of last year. Residual stocks gained 661,000 barrels to total 43,364,000 barrels, which were 5,703,000 barrels or 15.1 percent over last year's stocks.

Gasoline production, including natural blended, for the week amounted to 14,396,000 barrels, a decrease of 44,000 barrels from the previous period, but 976,000 barrels or 7.3 percent more than was produced in last year's week. Stocks of this product continued to build during the week and totaled 107,576,000 barrels at the week's end. That total showed that stocks had risen 1,050,000 barrels during the seven-day period and were 3,279,000 barrels or 3.1 percent higher than the 13,420,000 barrels that were in storage a year before.

Daily crude oil production averaged 4,865,000 barrels during the week ended March 29, for a slight gain of 3000 barrels over the previous week's daily rate. This was also an increase of 441,000 barrels or 10 percent daily over output of the like week of last year.

Crude runs to stills dropped 42,000 barrels a day from the previous week's to average 4,843,000 barrels daily, which were 151,000 barrels or 3.2 percent more than the runs of the comparable period of last year.

Above ground stocks of refinable crude totaled 225,720,000 barrels on March 22, according to the Bureau of Mines. Those stocks were 3,379,000 barrels greater than those held a week before and 567,000 barrels more than were held a year before.

Trends of Operations and Changes in Stocks

Figures on crude stocks are from Bureau of Mines weekly reports; all others from American Petroleum Institute weekly reports, which are estimates on Bureau of Mines basis.

(All figures in thousands of barrels—add 000)

HIGHS AND LOWS OF RECENT YEARS

ITEM	Crude Oil Prod.		Runs to Stills		Crude Stocks		Gasoline Stocks		Gasoil and Distillate Stocks		Residual Fuel Oil Stocks	
	Barrels Daily	Week Ended	Barrels Daily	Week Ended	Barrels	Week Ended	Barrels	Week Ended	Barrels	Week Ended	Barrels	Week Ended
Highs:												
1942	4,337	2- 7	3,961	1- 3	263,208	3-28	[1]109,281	3-14	47,861	11-14	95,857	1- 8
1945	4,944	7-21	[1]5,140	8-18	227,554	10-13	99,012	3-24	45,341	11-17	56,074	1- 6
1946	[1]4,961	6-15	4,968	12-28	229,430	3- 2	105,233	2-16	[1]67,286	11- 9	61,636	11- 2
1947	4,865	3-29	4,986	3-15	225,720	3-22	107,576	3-29	58,034	1- 4	53,285	1- 4
Lows:												
1945	3,621	10- 6	3,409	10- 6	[2]211,813	8-25	70,791	10-13	26,483	3-17	38,548	5-26
1946	4,403	3- 9	4,498	1-12	218,193	1- 5	85,324	9-28	25,131	3- 9	37,289	4- 6
1947	4,531	1-11	4,737	2-15	220,313	2- 8	94,882	1- 4	32,737	3-29	42,703	3-22

TRENDS OF 1946 AND 1947

Trends in Week Ended	Crude Oil			Gasoline		Gasoil and Distillate		Residual Fuel	
	Production Daily	Runs to Stills Daily	Stocks Week End	Production Weekly	Stocks Week End	Production Weekly	Stocks Week End	Production Weekly	Stocks Week End
1946:									
January 5	4,548	4,651	218,193	14,488	98,494	5,923	35,199	8,867	42,371
January 26	4,626	4,553	220,544	13,622	101,737	5,720	29,498	8,411	39,722
February 23	4,714	4,595	226,699	13,175	104,709	5,728	25,398	7,913	39,290
March 30	4,425	4,684	224,994	13,896	104,715	5,337	28,240	8,738	37,746
April 27	4,672	4,585	224,443	14,228	99,631	5,568	30,466	9,204	39,404
May 25	4,759	4,857	222,214	14,312	95,769	5,463	32,973	8,908	43,368
June 29	4,957	4,854	223,883	14,500	92,333	5,325	37,762	8,828	46,477
July 27	4,926	4,896	223,756	14,535	88,626	5,817	44,316	8,217	49,517
August 31	4,833	4,911	227,132	15,014	87,217	5,630	53,134	8,539	53,173
September 28	4,778	4,829	223,043	14,675	85,324	5,632	59,827	8,172	57,657
October 26	4,730	4,758	221,184	14,863	86,423	5,710	65,499	7,728	60,872
November 30	4,795	4,707	227,693	15,145	88,371	5,258	66,062	7,672	58,647
December 28	4,713	4,968	225,995	15,604	93,126	5,931	58,941	8,181	53,427
1947:									
January 4	4,649	4,917	223,291	15,281	94,882	5,857	58,034	8,375	53,285
January 25	4,672	4,820	221,655	14,624	99,801	5,630	50,357	8,224	48,558
February 22	4,786	4,860	224,580	14,668	103,904	5,929	40,739	8,542	44,919
March 1	4,771	4,896	225,131	15,191	105,803	5,488	38,004	8,824	45,175
March 8	4,824	4,925	223,679	14,782	106,418	5,572	36,601	8,496	44,202
March 15	4,845	4,986	222,341	15,125	106,813	5,025	34,384	8,916	43,734
March 22	4,862	4,885	225,720	14,440	106,526	5,968	32,993	8,621	42,703
March 29, 1947	**4,865**	**4,843**	.....	**14,396**	**107,576**	**5,969**	**32,737**	**8,668**	**43,364**
March 30, 1946	4,424	4,692	[3]225,153	13,420	104,297	5,496	29,615	8,592	37,661
Change:									
In Week	+3	—42	+3,379	—44	+1,050	+1	—256	+47	+661
In Year	+441	+151	+567	+976	+3,279	+473	+3,132	+76	+5,703
In Year	+10.0%	+3.2%	+0.3%	+7.3%	+3.1%	+8.6%	+10.5%	+0.9%	+15.1%

[1] Al time peak. [2] Lowest since December, 1921. [3] Stocks, March 23, 1946.

Pennsylvania Price Increases Eliminate All Subsidies

Increased price postings by leading purchasers of Pennsylvania grade crude wiped out all subsidies previously paid by the government for that crude and gave some area's producers as much as 26 cents a barrel over bonus levels.

Joseph Seep Purchasing Agency of the South Penn Oil Company announced a straight 10 cents a barrel increase in its posting for Pennsylvania crudes effective April 1. The company's new prices per barrel are $3.91 for Allegany and Bradford, $3.70 for Southwestern Pennsylvania and Eureka (West Virginia) and $3.66 for Buckeye (Ohio).

The Penzoil Company also boosted its prices 10 cents, with the new range being $3.73 to $3.78 per barrel for Lower Pennsylvania district crude in National Transit Lines. Valvoline Pipe Lines and Tide Water Associated Oil Company also met the 10 cent increase for all crudes of the grade they purchase.

The new price hike completely eliminated subsidies paid by the RFC on this grade of crude and left the nation without a subsidized producing area. This raise, however, was made effective at the same time that the stripper-well subsidy payment program expired by statute. Producers will realize a net gain over subsidy levels of 6 cents per barrel in the Bradford and Allegany areas, 20 cents in southwestern Pennsylvania, and 26 cents in West Virginia and Ohio. Pennsylvania's Middle district producers will now receive the same price as previously, as their bonus had been 10 cents the amount of the raise.

Canada's Turner Valley crude price was raised 35 cents per barrel to $3 for 42-gravity and decreasing 2 cents for each degree of gravity drop, effective April 1. Refined product prices also increased across Canada from one to 3½ cents per gallon following the ending of government price ceilings and the increased crude and other costs that the industry is passing on to the consumer.

• California

Kern County's Bacon Hills Area Due to Get New Field

New field likely in Bacon Hills area of Kern County; Cymric production extended east; Fresno County test drilling after logging oil showings; indications favorable to oil discovery in Ventura County; new producer in West Mountain field is best completion to date; Long Beach field deep test reaches 8100 feet.

Kern County: Seaboard Oil Company has apparently made an oil discovery in the Bacon Hills area, 21-28s-20e. On a test for water shutoff in Seaboard-Bandini 3-21 through 4½-inch holes shot at 7835 feet, with tester open 45 minutes, the net rise was 1000 feet, including 500 feet of 36-gravity oil. The oil recovery was considered surprisingly good since the 4 perforations were 20 feet above the top of the Oceanic sand. Operator has run casing and will gun-perforate and test the Oceanic between 7855-80 feet. The test was undertaken jointly with Bandini Petroleum Company. Bandini spent almost 2 years on a wildcat 1 mile southeast which had slight oil showings but was wet on all tests, leading to abandonment about a year ago at 11,001 feet.

Universal Consolidated Oil Company has completed Sauerdough 11, east extension well in the Cymric field, 23-29s-21e, flowing 583 barrels daily of 38-gravity oil through 13/64-inch choke from the Oceanic, principal producing sand in the field. Location has been staked for Sauerdough 12 a location west.

Fresno County: Sharples Corporation which logged oil sand showings a week earlier between 8278 and 8326 feet in its Hyde 1 wildcat, 1 mile north of the East Coalinga Extension field, has resumed drilling. Depth is 8550 feet with no showings below 8326 feet.

Ventura County: Standard Oil Company of California has built a new derrick to replace the one destroyed when McGrath 2, wildcat near Montalvo in 26-2n-23w, caught fire and burned for 2 days. Gas flow was estimated at 15 million cubic feet. If operations can be resumed, tests will be made at 8428-471 feet. An oil or gas discovery may be in the offing. Standard has made no comment except that indications are favorable to a discovery.

The best well ever completed in the West Mountain field was brought in when D. D. Feldman completed Richardson Estate 2 flowing 200 barrels of clean oil and 750,000 cubic feet of gas through a 12/64-inch choke. Well was drilled in with oil. Total depth is 4800 feet.

Los Angeles County: Richfield Oil Corporation was ready to complete Union Pacific Unit 4 in the East Los Angeles field. Richfield has awarded a contract for 6 additional wells in the field to Rocky Mountain Drilling Company.

Cleveland Oil Company has completed a good well on a 20-acre lease in the Inglewood field acquired from Hogan Petroleum Company. Machado 5-A was brought in flowing 250 barrels of 30-gravity oil through a ½-inch choke. Operator will drill another well.

The British American Oil Producing Company is drilling below 9100 feet in Bodger 3 in the Alondra field. Location is 600 feet from the discovery.

Shell Oil Company has reached 8100 feet in Dolley 2, an outpost test on the north flank of the Long Beach field in 29-4s-12w. Shell will make the well a deep test. The company only recently acquired the lease which comprises 340 acres. There is one shallow producer on the property about 270 feet south of the Shell location.

Military Leave Pay Granted

As an added incentive encouraging peacetime military training, employes of The Carter Oil Company who are members of reserve organizations of the Army, Navy, Marine Corps, Coast Guard and National Guard and who are called to camp or active duty for training, will receive full company pay for a maximum of 15 days a year. Carter's board of directors, in authorizing the liberalized pay plan, emphasized that it was in addition to the regular company vacations with pay.

• Oklahoma

Royalty Under Deepest Hole Sold at Indian Agency Sale

Royalty under world's deepest hole sold at Indian agency sale; shallow sand shows gas on flank of East Sasakwa area; deep pay proven on flank of Knox pool; new zone opener continues flow; Alfalfa County wildcat has oil shows; offset to North Lindsay pool flows 423 barrels per day.

Caddo County: Royalty under and offsetting the world's deepest hole was purchased at a Kiowa Indian agency sale by W. R. Ramsey and Willard L. Miller, Oklahoma City. Ramsey paid $281.10 per acre for 20 acres and Miller paid the same price for the two 10-acre units under the well in the northeast quarter of 11-8n-2w. He paid $100 per acre for 40 acres in the northwest of 12-8n-12w, offsetting the wildcat. The well is The Superior Oil Company of California's Weller 51-11, NW NW NE 11-8n-12w, 5 miles north of Fort Cobb townsite. It is bottomed at 17,236 feet, with drill pipe stuck about 25 feet off bottom. All efforts to cut pipe above tools have met with failure, but on April 1 crew was going in the hole again with cutters to try to sever the pipe. Ramsey

Wells Completed in the United States in Week Ended March 29, 1947

Data preliminary and subject to revision. Revised and more complete data on all completions and exploration shown in monthly summaries published in last issue of each month.

State or District	FIELD COMPLETIONS: New Wells: Oil	Dist.	Gas	*Input	Dry	Total	Old Wells Deepened	EXPLORATORY COMPLETIONS: Oil	Dist.	Gas	Dry	Total	ALL COMPLETIONS: This Week	Last Week	This Week 1946
Alabama	1					1							1		
Arkansas	1				2	3					1	1	4	1	7
California	28					28					3	3	31	33	35
Colorado	4					4							4	4	1
Florida														1	
Illinois	22				13	35		1			3	4	39	31	37
Indiana	3		1		3	7		1			1	2	9	10	15
Kansas	27		1		8	36	4	1			4	5	45	56	30
Kentucky	3					3		2			1	3	6	8	4
Louisiana	12	1	2		4	19					4	4	23	16	24
N. Louisiana	6		2		3	11					1	1	12	8	15
S. Louisiana	6	1			1	8					3	3	11	8	9
Michigan	6				4	10					4	4	14	4	
Mississippi	2		1		1	4		1			1	2	6	7	
Missouri															1
Montana														1	3
New Mexico	8		2			10					2	2	12	24	4
New York	13			8		21							21	20	28
North Carolina														1	
Ohio	15		5		5	25					3	3	28	25	8
Oklahoma	50		5		23	78					15	15	93	57	48
Pennsylvania	27		2	15	1	45							45	49	51
Texas	97	5	7		22	131	4	6	1		27	34	169	174	162
Districts:															
1. S. Central	2					2					3	3	5	5	2
2. Middle Gulf	13	1				14		1			3	4	18	16	[1]
3. Upper Gulf	9	3			4	16		1			3	4	20	15	20
4. L. Gulf-S. W.	15	1			3	19		1	1		4	6	25	21	31
5. E. Central	2				1	3					1	1	4	1	[2]
6. Northeast	1		2		2	5					2	2	7	6	13
7-B. N. Central	2					2		1			3	4	6	15	[3]
7-C. W. Central	1					1					1	1	2	6	[4]
8. West	23				3	26					1	1	27	34	42
9. North	24				9	33	4	2			5	7	44	41	45
10. Panhandle	5		5			10					1	1	11	14	9
West Virginia			13		3	16							16	12	20
Wyoming	1					1					2	2	3	1	3
Total U. S.	320	6	39	23	89	477	8	12	1	...	71	84	569	535	495

* Includes salt water disposal wells. [1] Middle Gulf included with Lower Gulf-S. W. [2] East Central included with Northeast. [3] N. Central included with North. [4] West Central included with West.

and Miller's bids were the only ones received by the agency.

Hughes County: Discovery of a new shallow sand on the flank of the old East Sasakawa area in the southern part of the county has been credited to Coleman H. Peters' Pernosky 1, NW NW NE 29-6n-8e. The unidentified sand was found at 493-509 feet, which cleaned the hole and showed for about 2 million cubic feet of gas per day. This flow has been killed and crew will drill on to the Calvin sand, main pay in the area.

Grady County: The Ohio Oil Company apparently has proven production in the Dornick Hills sand zone on the flank of the old Knox field. The Woods 1, NE SW NE 17-3n-8w, recovered 1320 feet of 41.7-gravity oil on a drill-stem test in the new zone at 3480-509 feet. On a second test of the formation at 3540-75 feet, the well showed 3½ million cubic feet of gas and flowed oil at the rate of 50-75 barrels hourly. Hole was deepened to 3940 feet to penetrate the entire zone. The well opens a wide area of development on the west flank of the old field, which was discovered in 1916. The field did not get under actual development until 1924.

Garvin County: Glove Oil & Refining Company and Vickers Petroleum Company's Carr Community 1, NW NE SE 29-3n-2w, east side of the Southwest Antioch pool, continues flowing at the rate of about 30 barrels of oil per hour from a new zone. Pay is from the Bromide sand at 7471-588 feet. All other wells in the pool produce from the Pennsylvanian sand, which is shallower than the Bromide. Crew will drill to the Carr before completion.

Alfalfa County: A wildcat near the town of Carmen may give the county its first commercial oil production. The test is Gutowsky Brothers' Pelter 1, CNE SE 21-25n-12w, 3½ miles northwest of Carmen and 15 miles southwest of Cherokee townsite. Operators indicate there is a good possibility that oil may be found in the Mississippi lime from 5989-6050 feet, after gas showed, and oil was observed dripping from the bit the last time tools came out. Wilcox sand was found at 7213 feet, where water was encountered.

McClain County: Max Pray and R. L. Bauman's Gulf-Wynn 1, NE NE SE 27-5n-4w, offset to the productive North Lindsay pool, made a natural flow of 423 barrels of oil per day through ¾-inch choke from the Chimney Hill section of the Hunton lime, perforated at 10,115-160 feet. The test will open production about ¾ mile south of the North Lindsay pool, and indications are that operators will drill several other tests in the immediate vicinity.

DAVE SANDLIN J. D. SANDLIN

SANDLIN BROS.

Drilling Contractors

HEAVY POWER RIGS

FOR WELL SERVICE

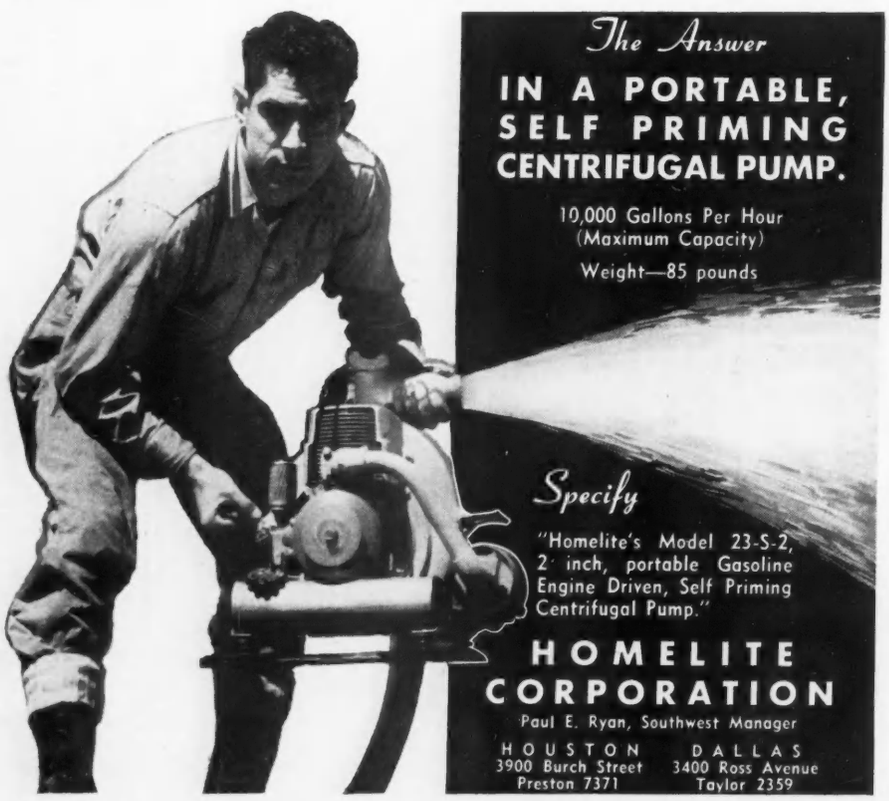
HEAVY STEAM RIGS

FOR CONTRACT DRILLING

New Iberia, La.

P. O. BOX 523 — PHONE 1212

Houston Office: 912 Southern Standard Bldg., Phone C 4-3982



• Kansas

Barton County Wildcat Test May Be Arbuckle Producer

Barton County wildcat tests Arbuckle for possible oil production; Ellsworth County pool well may get state rating of 3000 barrels daily; Pawnee County wildcat looks unfavorable for good production.

Barton County: Sohio Petroleum Company and the Kiowa Drilling Company were testing in the Arbuckle lime at Horejsi 1, NW NW NW 12-16s-11w. The test, 1½ miles west of the Stoltenberg pool of Ellsworth County, logged good odor and porosity in the Arbuckle at 3340 feet.

Ellsworth County: A well in the north end of the Edwards pool may be assigned a maximum potential of 3000 barrels daily. The test is J. C. Dozier et al's Kafka 1, SW SW SW 15-17s-8w. Production is from the Arbuckle lime at 3264-67 feet, with the formation topped at 3263 feet.

Pawnee County: The J. M. Huber Corporation and Earl Wakefield's Ficken 1, wildcat in NW NW NE 32-19s-18w, which at first appeared as a good pool opener 11 miles northwest of the Rutherford pool, has shown unfavorably on recent tests. After swabbing 16.24 barrels of oil and no water in 9 hours from the Arbuckle lime at 4090 feet, oil was exhausted. Operators deepened to 4095 feet, where water was found, with only a scum of oil. Testing continued.

PESA Meeting

Three hundred or more members of the Petroleum Equipment Suppliers Association are expected to attend the annual meeting at the Mark Hopkins and Fairmont hotels, San Francisco, May 4-7. Hugh H. Glen, president of Emsco Derrick and Equipment Company, is association president and also heads the convention arrangements committee. H. R. Safford, Jr., Houston, is the group's executive secretary.

• New Mexico

Well Near Eunice Townsite Passes Up Simpson Oil Flow

Oil flow from Simpson passed up by well near Eunice townsite; south extension to Brunson field has large initial flow; Lea County wildcat showing water with small oil yield.

Lea County: Magnolia Petroleum Company's Corrigan 1, C SW SE 33-21s-37e, deepened Permian producer and east offset to the most northerly Ellenburger producer in the Brunson field, landed pipe on bottom at 7658 feet after flowing from Simpson and Ellenburger. Oil flow from the Simpson, which has indicated production but passed up for the more productive Ellenburger in this area, was through testing tool at 7456-520 feet. A drill-stem test of the Ellenburger at 7526-7615 feet resulted in a flow of 77 barrels of oil in 2 hours, with gas-oil ratio 1104/1.

Amerada Petroleum Corporation's Walden 1, NE SW 15-22s-37e, indicated ½ mile south extension for the sweet crude area, flowed 458 barrels of 43.7-gravity oil, with gas-oil ratio 837/1, after using 500 gallons of mud acid through perforations at 7700-858 feet. The Ellenburger was entered at 7690 feet and granite at 7858 feet with elevation 3402 feet. The company skidded rig 100 feet north to drill Walden 2 to the Yeso 6500-foot pay. Twin and triple wells to the deeper pays are becoming common practice to the north and south of Eunice townsite.

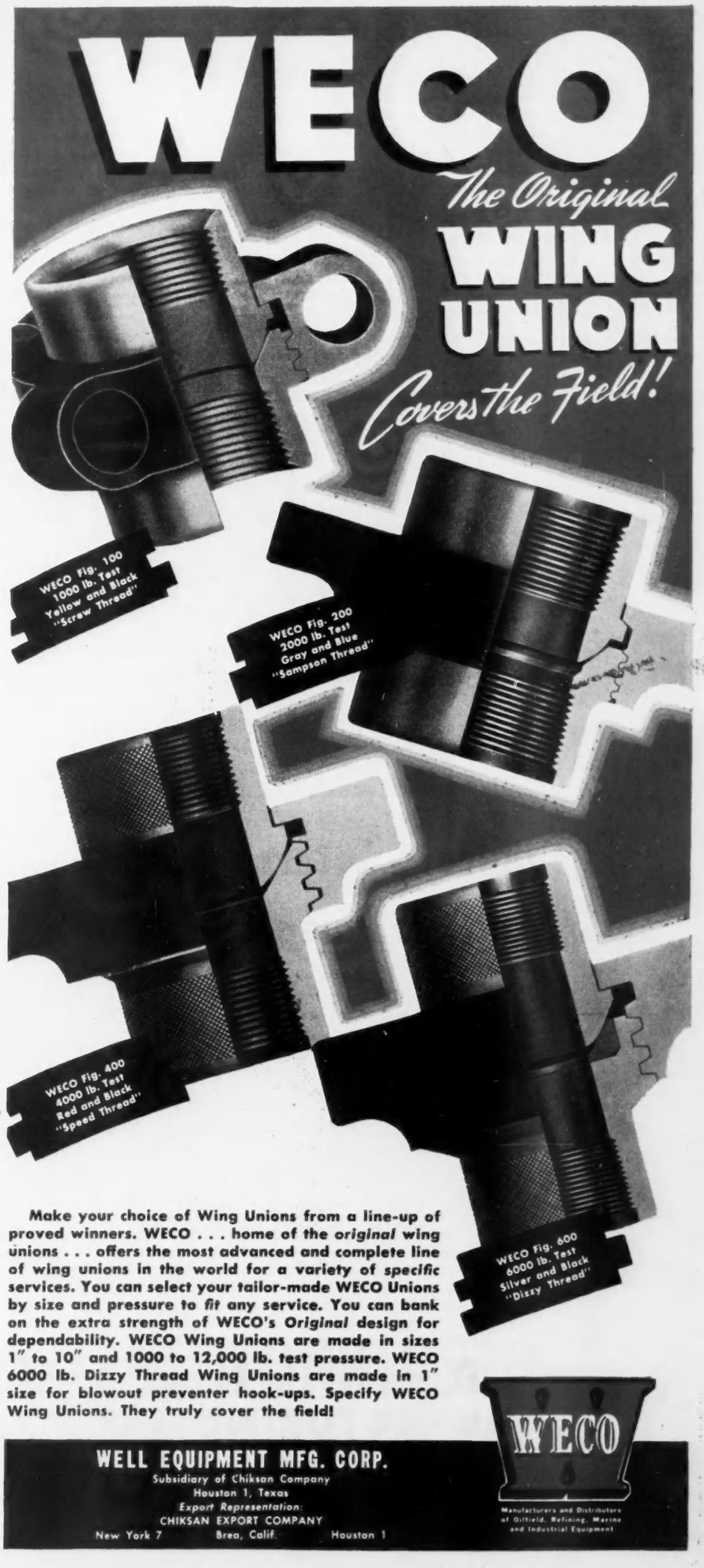
Wildcat: The Texas Company's Garrett 1, prospective discovery and 9 miles east by north of the Lovington field, declined to 3 barrels of oil and 7 barrels of basic sediment and water on 6-hour test from 3 zones in the San Andres between 5300-5690 feet. The company's State 1-AK, 1¼-mile northwest outpost, used a 20-quart nitro shot to try to dislodge junk after drilling into old hole, with the well bottomed at 4991 feet. This lease expires April 10.

• West Texas

Crane County Wildcat Tests Oil Pay in Ellenburger

Crane County wildcat tests oil pay in Ellenburger, making 5 prospective oil producing zones; twin-drilling to start in the South Fullerton-Devonian field; most northerly producing area in Permian Basin registers disappointment after aggressive lease and royalty play.

Crane County: Gulf Oil Corporation's University 1-HH, SW NE Sect. 3, Block 31, 3¾ miles north by east of the Block 31 two-pay field and separated by a deep syncline, entered Ellenburger at 10,596 feet, and showed oil and gas in 10-foot dolomite core pulled at 10,610 feet. Another core was to be cut before attempting drill-stem test. This wildcat, situated on 1600 acres acquired at the June, 1946, University sale for $422,000 cash, indicated probable oil production in the Devonian, Silurian and McKee sand of the Simpson. The best showing was from the Upper Waddell broken sand section at 10,340-74 feet, which yielded 564 feet of 43.2-gravity oil and 329 feet of oil- and gas-cut mud, and 8570 feet of 37.7-gravity oil from Lower Waddell sand at 10,507-26 feet. Gulf



Make your choice of Wing Unions from a line-up of proved winners. WECO . . . home of the *original* wing unions . . . offers the most advanced and complete line of wing unions in the world for a variety of *specific* services. You can select your tailor-made WECO Unions by size and pressure to *fit* any service. You can bank on the extra strength of WECO's *Original* design for dependability. WECO Wing Unions are made in sizes 1" to 10" and 1000 to 12,000 lb. test pressure. WECO 6000 lb. Dizzy Thread Wing Unions are made in 1" size for blowout preventer hook-ups. Specify WECO Wing Unions. They truly cover the field!

WELL EQUIPMENT MFG. CORP.
Subsidiary of Chiksan Company
Houston 1, Texas
Export Representation:
CHIKSAN EXPORT COMPANY
New York 7 Brea, Calif. Houston 1

WECO
Manufacturers and Distributors of Oilfield, Refining, Marine and Industrial Equipment

has a solid block of leases held by production immediately north of the discovery.

The Texas Company's Connell 31, Ellenburger prospect and 3 miles west by south of a recent Ellenburger-pay discovery for the Jordan field, was drilling lime at 6410 feet, having passed up oil and gas showings with water in 3 zones.

Andrews County: Sinclair Prairie Oil Company's University 2-160, ¼-mile east outpost for the South Fullerton-Devonian field and a failure in the Devonian, flowed 772 barrels initial via 1-inch choke after acidizing Clear Fork (Fullerton) pay at 6975-7120 feet. The Devonian registered a sharp east dip. Clear Fork production was passed up by the 16 Devonian producers, and twin locations are being authorized by Gulf for 4 completions in order to produce the shallower zone. Others will follow suit.

Hale County: Stanolind Oil & Gas Company's LaFont 1, C NE NW E.L.& R.R 10, Block C-L, southeast offset to the Petersburg field flowing discovery from Pennsylvanian at 6890-992 feet, was drilling shale above the pay at 6895 feet. This confirmation well correlates about 160 feet low on upper markers, and caused the company to hold up on drilling projected ½-mile outposts east and south. However, the company is drilling a northwest outpost, while Standard Oil Company of Texas and Humble Oil & Refining Company's Hunt 1, west offset to the producer, was installing blowout preventer at 1000 feet. This area was in line to receive a major drilling program if the size of the producing area fulfilled expectations.

Seventh consecutive producer for the Irish field, southwestern part of the county, was recorded when The Pure Oil Company completed Preston 3 for potential flow of 336 barrels after multi-stage acid treatment of Clear Fork at 5585-988 feet. These producers have an average of 290 feet of broken pay section.

Coke County: Sun Oil Company's Fred Jameson 1, south offset to its Jameson field discovery and a failure in the Ellenburger, which yielded oil and water at 7045-130 feet, was preparing to complete from Crinoidal perforations at 6165-230 feet.

Mitchell County: Standard of Texas' Womack 1, 2 miles northwest of the Westbrook field, original oil producing area for the Permian Basin, was drilling at 2700 feet after testing a small volume of oil and water from broken pay at 2550-65 feet and 2640-53 feet. The San Andres was entered at 1675 feet with elevation 2179 feet.

Ector County: Gulf's Goldsmith 421-E, near apex of the Goldsmith's Permian producing structure, confirmed previously indicated production from the Devonian after plugging back from water in Ellenburger at 9685-811 feet, but will reperforate to try to exclude water. This new-pay discovery flowed natural 238 barrels of oil and 45 barrels of basic sediment and water on 11¾-hour gauge through open tubing, with gas-oil ratio 738/1, then flowed 304 barrels of oil and 203 barrels of water on 24-hour gauge, with gas-oil ratio 434/1, from perforations at 7980-8015 feet. The Devonian was entered at 7975 feet, with water indicated at 8055 feet. This workover operation caused temporary delay in starting a second Ellenburger test to the northwest ¾-mile.

Phillips Petroleum Company's TXL 1-M, Ellenburger wildcat and 4¾ miles west of the Goldsmith project, entered barren Devonian at 8685 feet, or 562 feet low, and was drilling lime at 9020 feet.

Property Sales: Humble sold its six 6000-foot Clear Fork pumpers, which average 318 barrels daily with considerable water, and about 10,000 acres of suporting leases in the Anton area, Lamb County, to Etz and Robertson. Humble also withdrew from the Levelland field through the sale of its Montgomery 531-acre lease, with 3 wells, to Stanolind.

C. W. Brown, McCamey producer, acquired 18 stripper-well pumpers in the McCamey field for $129,000 from Charles Marsh, II, Garrett Smith and D. R. Semmes.

Winkler County: Mid-Continent Petroleum Corporation's TXL 1-N, C SE NE T&P Railway 21, Block 46, T-1-N, 3 1/3 miles northwest and on a geological strike with the TXL field, was drilling lime and chert at 8430 feet. This wildcat enhanced its outlook for Silurian or Ellenburger production in recovering 510 feet of oil- and gas-cut mud and headed briefly when tester was used in the Devonian at 8148-8270 feet. This showing will warrant the setting of pipe for a production test after depth contract is fulfilled. Production trend to the northwest is open in the TXL field.

Amon Carter et al's Wight-Gulf 1, wildcat and structurally low, was drilling sand and shale at 11,730 feet, having entered the Simpson at 11,150 feet.

WANTED—

Producers Interested in Cutting Pumping Costs

There isn't a man alive — especially an oil man — who isn't interested in cutting operating costs.

Or is there?

If you are one of these non-conformers who is using antiquated production equipment, we suggest one thing — talk to Jensen users. They are hard-to-please, money minded individuals satisfied with nothing but the best.

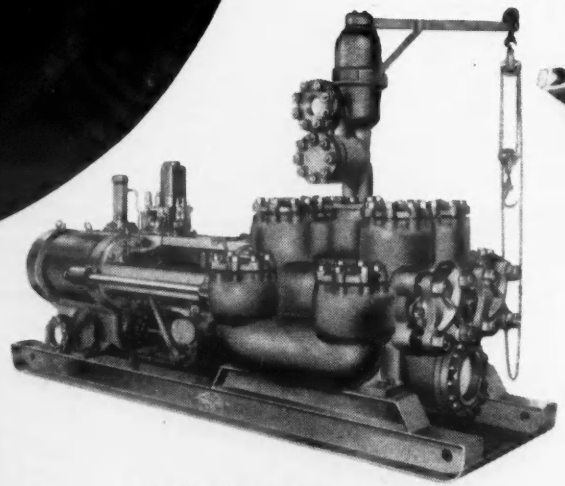
Also, your Jensen dealer knows good equipment. He will be glad to give you the benefit of his knowledge and experience. Contact him today.

JENSEN BROTHERS MANUFACTURING CO.

. . . Coffeyville, Kansas, U. S. A. . . .

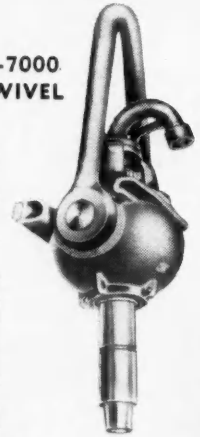
EXPORT OFFICE: 50 CHURCH STREET, NEW YORK CITY

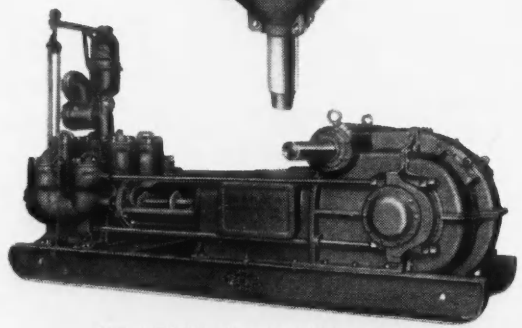
WHELAND WINNERS



H-20000-AA STEAM PUMP

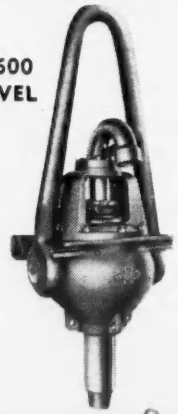
E-7000
SWIVEL



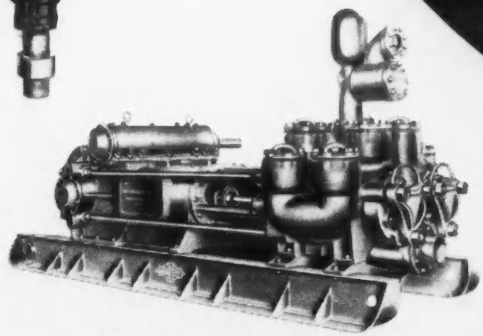


HP-15000-CF POWER PUMP

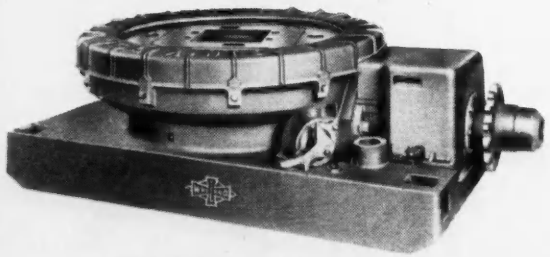
E-6600
SWIVEL



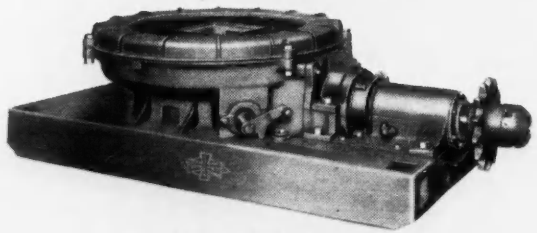
E-6000-BA
SWIVEL



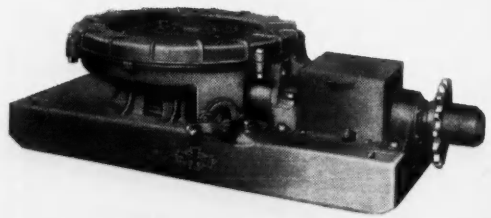
HP-11000-AB POWER PUMP



A-18000-B ROTARY TABLE



A-300 ROTARY TABLE



A-200 ROTARY TABLE

THE WHELAND COMPANY

ROTARY DRILLING EQUIPMENT

Chattanooga, Tenn.

• North Texas

Haskell County Deep Strawn Field Is Given Extensions

Haskell County deep Strawn field extended north and northeast; semi-wildcat in Throckmorton County develops oil flow from Bend line; Montague County wildcat lists second prospective oil producing zone.

Haskell County: Amerada Petroleum Corporation's Holt 1, southeast corner of C. W. Jones Survey and 2 locations north of the Humphrey-Chapman field's Upper Strawn discovery, was running pipe to complete at 4287 feet with 2 possible oil pays in the Strawn. Oil-saturated lime at 4069-112 feet yielded 3365 feet of clean cut oil and 235 feet of oil-cut mud, while broken oil-saturated sand 4248-87 feet tested a small amount of free oil and oil-cut mud. The Palo Pinto was entered at 3235 feet with elevation 1498 feet.

Mudge Oil Company's Baldwin 1, Thos. McMeary Survey and a northeast offset to the discovery, entered the upper pay at 4079 feet, and a drill-stem test at 4094 feet yielded gas to surface within 6 minutes while the recovery consisted of 2940 feet of oil and 300 feet of oil- and gas-cut mud. It will explore the lower zone before setting pipe.

Thos. D. Humphrey's Chapman 3, 1023 feet south of his Upper Strawn discovery pumper, flowed 50 barrels of oil on 5-hour gauge through 20/64-inch choke to become the first completion from the Lower Strawn sand at 4228-68 feet, with elevation of 1478 feet.

Throckmorton County: Mudge Oil Company's Graham 1, NE NE Sect. 2201, TE&L Company Survey, extended the Woodson area ⅞-mile east in flowing 30 barrels hourly through open tubing and later 9 barrels hourly through ¼-inch choke after acidizing Bend perforations at 3880-85 feet. This outpost swabbed 16 barrels of oil and 53 barrels of water initial from Mississippi open hole at 4680-4702 feet before plugging back.

Fred M. Manning, Inc.'s Brown 1, northwest corner of Sect. 919 and 1/3 mile northeast of the firm's Record 1, recent discovery, flowed 261 barrels of oil initial through 12/64-inch after acidizing Mississippian open hole at 4682-4706 feet. Both wells passed up commercial production in the Bend.

Montague County: Continental Oil Company's Magee 1, C. A. Wright Survey and 3 miles southeast of Montague, was drilling at 6630 feet to explore the Ellenburger before setting pipe for completion try. Favorable showing previously listed for the Strawn was supplemented by recovery of 90 feet of oil and 30 feet of oil- and gas-cut mud from conglomerate beds at 6482-95 feet.

THIS HOOK WILL

REALLY REACH OUT

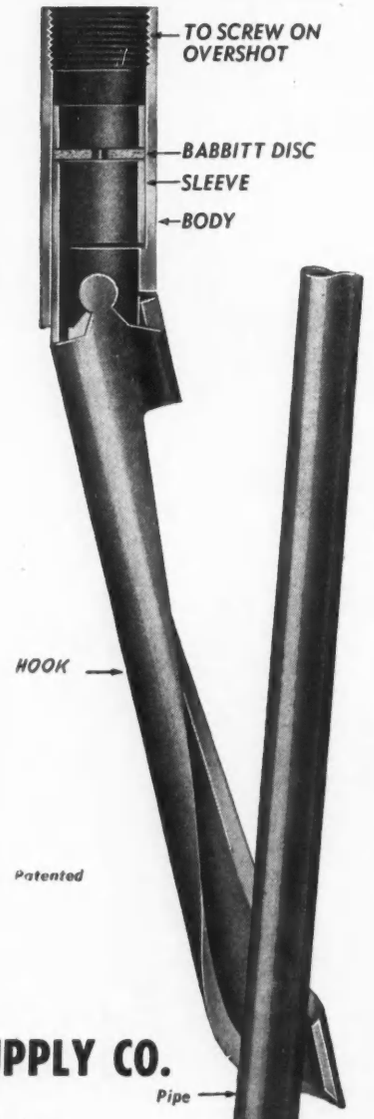
AND CATCH THAT FISH

When you're fishing in "strange waters" and are uncertain as to exact conditions at the bottom of the hole, you'll be money ahead to use a hook that'll reach out and hunt for that fish . . . and straighten it up in position for the overshot.

The Big Four Hydraulic Wall Hook is run *below* the overshot . . . after the fish is caught, no pull is transmitted through the hinged joint of the hook. Thus, the weak point common to "kick-off" knuckle joints that are run *above* the overshot is eliminated . . . the strain which may be taken on the fish is limited only by the tensile strength of the fishing string.

Slush pump pressure actuates the hook, which has a "reach" of 36". Ample circulation for ordinary conditions is provided through a 1¼" hole through the babbitt disc in the hook, however, *if full circulation is required, slush pump pressure of 500 to 600 pounds will break the disc and provide a full opening through the hook.*

Inquire about the Big Four Hydraulic Wall Hook . . . it's made in a variety of sizes.



BIG FOUR MACHINE AND SUPPLY COMPANY

BIG FOUR MACHINE & SUPPLY CO.

CLAY CITY, ILLINOIS

Manufacturers of Big Four (Brauer) Products

Two Natural Gasoline Plants Planned for West Texas

Two additional natural gasoline plants have been authorized for West Texas fields. Sid W. Richardson and associates will erect a plant in the Keystone multi-pay field, while Gulf Oil Corporation and others will provide the initial plant for the Sand Hills field, Crane County.

Richardson and associates, owners of 39 percent of the productive acreage in the Ellenburger sector of the Keystone field, authorized the construction of a 70 million cubic foot daily capacity absorption type unit. The Ellenburger casinghead gas yields from 3½ to 4 gallons of gasoline per 1000 feet of gas, with a nominal sulphur content. The plant also will utilize gas from the field's 5 shallower oil zones. Plant residue gas will be purchased by the El Paso Natural Gas Company in supplying its California market outlet. Other lease owners in the field will be given an opportunity to participate in the project.

Gulf has projected a 23 million cubic foot daily capacity absorption type plant for the Sand Hills four-pay area. Initial delivery of equipment is scheduled for June.

Sun Names Executive Group To Administer Policies

Joseph N. Pew, Jr., chairman of the board of directors of Sun Oil Company, announced the creation of an executive committee to administer policies established by the board and to coordinate the operations of the company.

Members of the committee are Joseph N. Pew, Jr., chairman; Robert G. Dunlop, president of Sun Oil Company; S. B. Eckert, vice president in charge of marketing; C. H. Thayer, vice president in charge of manufacturing, and Jno. G. Pew, vice president in charge of production.

Appointment of the new committee members follows a recent board action amending the bylaws of the company to provide for the establishment of an executive committee to consist of the chairman of the board, the president, and three others.

• East Texas

Houston County Test Passes Up Nominal Glen Rose Shows

Houston County wildcat and deep test on flank of Hawkins field passes up nominal oil and gas shows; Mount Sylvan area has small pumper and outpost failure.

Houston County: Magnolia Petroleum Company's Grounds 1, J. C. Luse Survey and 6 miles southeast of Grapeland, was coring lime at 8670 feet after recovering nominally oil- and gas-cut mud when tester was used at 8445 and 8516 feet. The showing was from Upper Glen Rose, topped at 8232 feet with elevation 418 feet.

Continental Oil Company's Texas Long Leaf Lumber Company 1, Creek prospect, was coring at 8490 feet in Woodbine, topped at 7925 feet, with water in the sand beds.

Smith County: Phillips Petroleum Company's Curry-Opal 1, J. A. Malone Survey and a northeast offset to the Boynton pool's Paluxy discovery, was drilling at 5340 feet in Woodbine, topped at 5130 feet.

Humble Oil & Refining Company's Dowell 2, northeast outpost for the Mount Sylvan field, pumped 47 barrels of 29.7-gravity oil plus 78 percent water initial from Paluxy perforations at 7404-12 feet, having plugged back from 7500 feet. Humble's Wood 1, southwest outpost in Van Zandt County, was abandoned at 7758 feet without shows.

Limestone County: The Pure Oil Company's Berthelson 40, Mexia field deep test, was abandoned at 5723 feet in Travis Peak, topped at 5654 feet, with elevation 511 feet. All prospective deep producing zones tested water.

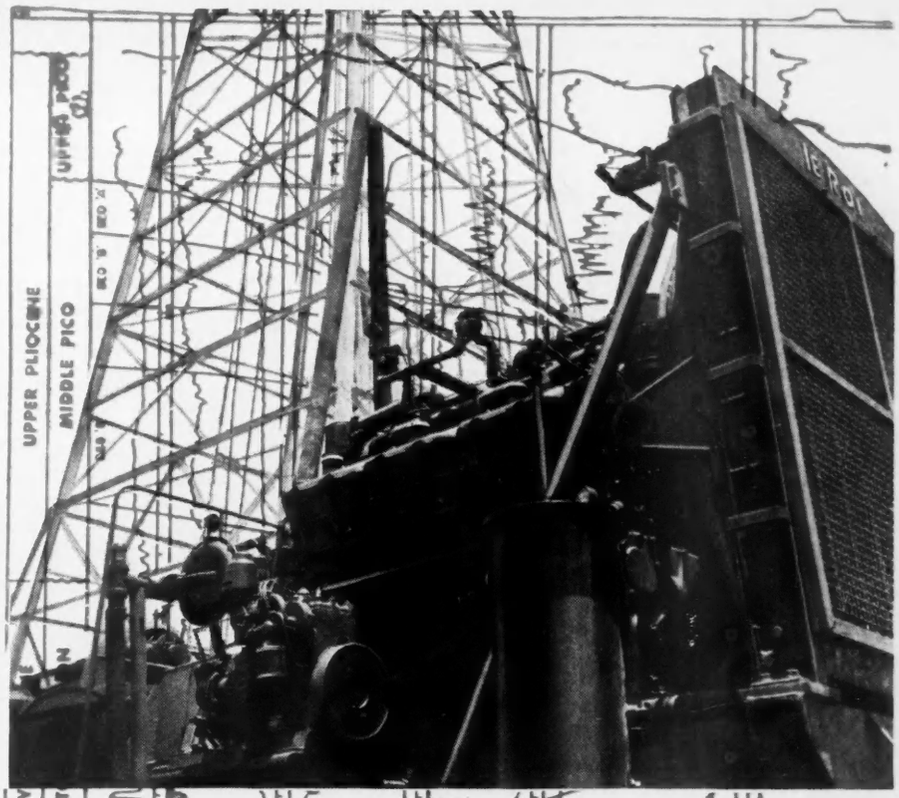
Hawkins Field: Humble's Little Sandy Club 1, Ed. Wideman Survey and on the northwest edge of the structure, was drilling shale at 8755 feet after failing to indicate production or water in the Upper Rodessa, although samples carried oil and gas showings. The Paluxy was entered near the 6700-foot level, and Rodessa near 7130 feet, with elevation of 318 feet. Massive anhydrite was logged from 8310 feet to 8585 feet. The company's McKnight 1, northeast outpost, was drilling Cotton Valley at 12,150 feet.

Cherokee County: Standard Oil Company of Texas' New Birmingham 1, discovery gasser, tested 2,200,000 cubic feet of gas with trace of distillate daily from Bacon perforations at 8608-52 feet. It is slated to be acidized after resetting packer, which developed leak when shutin pressure built up to 4000 pounds.

Delta Drilling Company and Al Brown's Lester 1, Travis Peak prospect, was drilling at 8770 feet, having entered Barren Pettit at 8710 feet.

Freestone County: The Texas Company's White 1, Smackover test and west outpost for the Fairfield multi-pay field, recovered stuck drillpipe at 13,508 feet, and was drilling lime at 13,580 feet. It is within 200 feet of the district's depth record.

Kaufman County: Humble Oil & Refining Company's Guy 1, J. S. Ables Survey and ¾ mile northeast of its 6475-foot Travis Peak failure, landed protection pipe at 3679 feet and was drilling at 3810 feet in Georgetown,



Geology plays tricks

. . . but you can always count on LE ROI reserve power, acceleration, and dependability to make hole faster with larger profits for you

Formations vary, giving drillers a bad time, but Le Roi performance is always dependable. First of all, Le Roi engines are conservatively rated — there's a lot of reserve power in every unit, put there to help your crew out of tight spots. Moreover, every part in the engine is designed to handle all this extra power with ease. That is why Le Roi engines keep on lugging.

Round-trip time is reduced because of the rapid acceleration engineered into each Le Roi engine. Le Roi's jump like jackrabbits when you give them the gun — you get back to drilling in a hurry, make hole faster and at greater profit.

See your nearby Le Roi distributor. He can show you the Le Roi engine best suited to your job. Horsepower sizes range from 4 to 400, and they operate on natural gas or butane, as well as gasoline. Let him show you, detail by detail, why so many oilfield men standardize on Le Roi engines. Write for latest, fact-filled bulletins.

LE ROI COMPANY Milwaukee 14, Wisconsin

New York • Washington • Birmingham • Tulsa • San Francisco

LE ROI MILWAUKEE

Oklahoma
Le Roi Company Branch — Tulsa
Carson Machine & Supply Co. — Oklahoma City

East & South Texas, Gulf Coast
Southern Engine and Pump Company — Houston, Kilgore, Edinburg, Dallas, San Antonio, Texas, and Lafayette, Louisiana.

North & West Texas, New Mexico
General Machine & Supply Co. — Wichita Falls, Odessc, Lubbock, Texas.

Kansas
Carson Machine and Supply Co.—Great Bend

Illinois — Western Kentucky
Western Machinery Company — Centralia, Illinois and St. Louis, Missouri.

Michigan
Hafer Engine Co. — Reed City

Rocky Mountain Area
Industrial Power Units, Inc. — Casper, Wyoming.

Northern Louisiana & Mississippi
Ingersoll Corporation — Shreveport, Louisiana, and Jackson, Mississippi.

West Coast
Le Roi-Rix Machinery Co. — Los Angeles, Calif.

Appalachian Area
Lloyd, Smith Company — Bradford, Penn.
P. C. McKenzie Co. — Pittsburgh

Canada
Drilling Supplies, Ltd. — Calgary, Alberta

Complete Sales and Service Facilities

P-90

topped at 3550 feet. It is due to explore the Smackover on a faulted structure.

Wood County: R. J. Caraway et al's Mullinax & Martin 1, Mary Polk Survey and a Travis Peak prospect, entered the Georgetown at 6235 feet, with elevation of 471 feet, and was drilling lime at 6320 feet.

Homer Snowden et al's Martin-Clanton 1, Allen Davey Survey, extended the Norman-Paul field southwest as the fourth flowing well from the sub-Clarksville sand with initial rating of 308 barrels of 32-gravity oil through ¼-inch choke from perforations at 4868-98 feet.

Bowie County: Tide Water Associated Oil Company & Seaboard Oil Company's Dalby & Joiner 1, D. Puckett Survey, entered the Paluxy at 4521 feet, and was drilling barren shale and sand at 4580 feet.

Barnsdall Oil Company et al's Greenwood 1, Lewis T. King Survey, was abandoned at 8188 feet in Smackover, topped at 7660 feet. Nominal streaks of saturation were logged in the top of the section.

Marion County: Magnolia Petroleum Company's second test for the Lassater field, Hall Estate 1, M. W. Moody Survey, plugged back farther into the Travis Peak, and perforated with 5 shots between 8790-92 feet before squeezing. Previous perforations at 8762-72 feet yielded a small gas blow and indicated gas-cut mud on test. Total depth was originally 10,241 feet.

• South Central Texas

Mile Northeast Outpost in Charlotte Field Is Tested

Mile northeast outpost at Charlotte testing; new producer finaled at Weigang; Bexar County wildcat abandoned; Medina County wildcat testing on the pump.

Atascosa County: At Charlotte field, Humble Oil & Refining Company was testing J. B. Henry 1, outpost a mile northeast of the field. Total depth is 5160 feet with 5½-inch casing set to 5150 feet. The well is 350 feet from the northwest line and 2400 feet from the northeast line of J. Poitevent Survey 5 and just northeast of Charlotte townsite.

At Weigang field, H. R. Smith and Skinner & Eddy have completed A. O. Schumann 6 as a new producer. On potential the well flowed 123 barrels of 24.5-gravity oil daily through 9/64-inch choke. Gas-oil ratio was 88/1, tubing pressure 218 pounds and casing pressure 110 pounds. Total depth is 3779 feet with 7-inch casing set on bottom and perforated for completion at 3765-70 feet.

Bexar County: Mellie Pegg & Milton Pegg & W. H. Bode's Lowe 1, wildcat 4 miles northeast of Lytle, has been abandoned as a dry hole. The wildcat was drilled to 985 feet and 5½-inch casing set to 914 feet. Open hole was washed with condensate and bailed but no show was encountered.

Medina County: John F. Camp and Sons' Fee 1, wildcat 3½ miles southeast of Devine, is testing on the pump. With total depth 2250 feet, the well is testing 5 to 6 barrels of oil daily on pump from perforations in the Navarro sand at 2240-50 feet.

Plant Contract Let

Contract for construction of a $4 million casinghead gasoline plant in the Rangely field, Rio Blanco County, Colorado, has been let by Stanolind Oil & Gas Company, Tulsa, and The California Company, San Francisco. Gas produced with oil will be processed at the plant and it is expected initial yields will average about 10,000 to 20,000 gallons daily. The Hudson Engineering Company, Houston, received the contract and work will start as soon as materials and men are available.

Gotkool
WATER CANS
& COOLERS
GOTT
PURE WATER
GOTKOOL WATER COOLER
Made in 2, 3, 5, 8, 10, 15 and 20 gallon sizes with Push-Button Faucet.
GOTT Water Coolers are the convenient way to keep drinking water handy to the worker, protect it from impurities. Their exclusive construction keeps water cool for long periods. Snug fitting large removable top, handy non-leaking push button faucet. GOTT Water Cans for handy field use. Your Supply Store has them, get one today! . . . .
H. P. GOTT MFG. CO.
WINFIELD, KANSAS
GOTKOOL WATER CAN
Made in 1½, 2, 3, 5, 10, 15 and 20 gallon sizes (Push-Button Faucet at slight additional cost.
KEEP PURE DRINKING WATER ALWAYS HANDY

• Southwest Texas—Lower Coast

Potential Run on La Gloria Field New Pay Zone Discovery

Potential run on new pay zone discovery on La Gloria's southeast flank; production tests to be made in 2 Nueces County wildcats; well completed in northwest extension area at North Minnie Bock; Duval County wildcat shows oil and gas on drill-stem test.

Jim Wells County: Magnolia Petroleum Company's El Contesto Unit 1-A, new pay zone discovery on the southeast flank of La Gloria field, flowed on potential 92 barrels of 40-gravity oil daily on ⅛-inch choke. Tubing pressure was 650 pounds, casing sealed, and gas-oil ratio 785/1. Total depth is 7800 feet with 7-inch casing set to 7422 feet and perforated for completion at 7302-10 feet. This well is 2300 feet northwest of Magnolia's Proctor 1, which produces from the regular 7200-foot sand.

Nueces County: Two wildcats have set casing in preparation for production tests. Pan American Production Company et al's Rivers 1, about 2½ miles south of Richard King field and 3½ miles west of Agua Dulce field, has casing set to 6031 feet. Total depth is 6316 feet and tests will be run of perforations at 5533-39 feet. Skelly Oil Company's Rivers 1, located 1½ miles west of Agua Dulce field and about 2 miles southeast of the Pan American test, has 5½-inch casing set to 6066 feet. Total depth is 7358 feet with production tests to be made through perforations at the 6000-foot level.

The Atlantic Refining Company's J. H. Wright 2, North Minnie Bock field and 1600 feet northeast of the Dugger 1 northwest extension well, has been completed for 119 barrels of 33.3-gravity oil daily through ⅛-inch choke. Tubing pressure was 200 pounds, casing sealed, and gas-oil ratio 510/1. Total depth is 6989 feet with casing set to 6981 feet and perforated for completion at 5958-62 feet.

Duval County: Magnolia's Duval County Ranch Company-State 1, wildcat 2 miles south of the Casa Blanca field and 4 miles west of Government Wells field, is drilling below 2341 feet after testing oil and gas in the Cole sand. On drill-stem test at 1325-30 feet the wildcat recovered 70 feet of oil-cut mud and developed 260 pounds flowing pressure, blowing gas, and showed bottom hole pressure of 400 pounds flowing and 550 pounds shutin.

• Middle Texas Coast

Gas-Condensate Discovery In Live Oak Being Finaled

Gas-condensate discovery in Live Oak County being completed; new deep gas-condensate discovery zone discovered at Wyrick; casing set in West Ranch field wildcat; extension test at Strauch-Wilcox abandoned.

Live Oak County: Continental Oil Company's Albert West 1-D, wildcat 3½ miles northwest of George West, is being completed as a discovery. On initial gauge the well flowed 22½ barrels of condensate daily through 5/32-inch choke and with gas-condensate ratio of 41,500/1. Total depth is 7411 feet with

7-inch casing set on bottom and perforated for completion at 6780-93 feet at the bottom of the Slick sand.

Refugio County: A new deep gas-condensate pay zone at Wyrick field has been opened by The Clymore Company's John L. Zarsky 3. The well tested 35 barrels of condensate and 10 million cubic feet of gas daily through choke. Total depth is 6408 feet with 5½-inch casing set to 5990 feet and completed in the 5840-foot sand. This well is 933 feet southeast of the Zarsky 1 gas discovery and 1500 feet south-southeast of the Zarsky 2 oil discovery well, both producing from a pay sand at the 4950-foot level.

Jackson County: Hinkle Drilling Company's "L" Ranch 1, wildcat ½ mile southeast of West Ranch field, has 5½-inch casing set to 5150 feet for production tests. Total depth is 6529 feet and tests are to be run in a Marginulina sand at the 5100-foot level.

Bee County: Mills Bennett has abandoned Schrock 1, 3200 feet north-northeast of the Berger 1 discovery at Straugh-Wilcox field. A 20-minute drill-stem test made in the top of the Luling sand at 8176-90 feet recovered the 2000-foot water cushion and 2430 feet of salt water and 180 feet of mud. Total depth is 8190 feet.

Texas A. and I. Offers Short Course in Gas Technology

The Texas College of Arts and Industries, Kingsville, is offering a second annual Short Course in Gas Technology, May 27-30. Sponsored by the Southern Gas Association, the short course will comprise two sections, according to Dr. Frank J. Detterweich, head of the A&I engineering department, who is chairman of the administrative committee.

Texas Meeting Today

Dr. Waldo E. Stephens of Oklahoma City, authority on world economics and politics, will be the principal speaker at the first annual meeting of the Texas Independent Producers and Royalty Owners Association at the Adolphus Hotel, Dallas, Monday, April 7. Former professor of Political Science at Columbia University, he will discuss the importance of oil on the international scene in his speech, "Our New Instrument of Foreign Policy."

• Upper Texas Coast

Wharton County Has Oil Field East of North Louise Area

Oil field discovered in Wharton County; tests being run in Rosenberg area wildcat; deep wildcat in West Conroe area abandoned; second well completed in Conroe field northeast extension area; oiler completed on east flank of Saratoga field.

Wharton County: Grubb and Hawkins' Peters 1, wildcat 3½ miles southwest of Lakeview production and 2 miles east of North Louise field, is an oil discovery. On completion tests the well flowed 110 barrels of 22.8-gravity oil daily through 8/64-inch choke and with estimated gas-oil ratio of 100/1. Total depth is 5503 feet with casing perforated at 4520-24 feet in the Frio. This test was drilled on a 2000-acre farmout from the Atlatl Oil & Royalty Company.

Fort Bend County: In the Rosenberg area H. W. Snowden was testing Mary Hobbs 1, wildcat 2 miles southwest of Cockburn's Marion Dzierzanowski 1 discovery. Total depth is 9015 feet with tests being run in sands near this depth. The well is reported to have cleaned slowly, showing some oil, mud and acid. The test is also reported to have sands with saturation in the Yegua, 22 feet of sand being topped at 7956 feet with 9 more feet of sand below 1½ feet of shale.

Montgomery County: The Superior Oil Company's Agnes Resher 1, wildcat in the West Conroe area, has been abandoned as dry. Total depth is 10,501 feet with a few slight shows found in the Wilcox and Cockfield.

A second oil well has been completed in the northeast extension area of Conroe field by S. E. McDaniel. Ove Wooten et al 1, John A. Davis Survey, flowed on potential 160 barrels of 38-gravity oil daily through ¼-inch choke with 180 pounds flowing pressure and gas-oil ratio 750/1. Total depth is 5146 feet with casing perforated at 5058-72 feet for completion. Northeast extension area production for the Conroe field was opened in February when McDaniel completed W. M. Williams et al 1, in WC RR Survey 13, A-645.

Hardin County: Gulf Oil Corporation's R. S. Sterling Fee 4, east flank producing area of Saratoga field, has been completed. On potential the well flowed 103 barrels of oil daily through ⅛-inch choke with gas-oil ratio 583/1. Total depth is 6007 feet and casing is perforated at 5576-606 feet for completion.

Bottom Water is a costly profit leak

Eagle Lead Wool

***stops* Bottom Water!**

You rule out the risk of oil-wasting bottom water shutdowns when you tamp Eagle Lead Wool in the hole. This finely stranded, non-corrosive metallic wool makes a water-tight plug that seals every crack and crevice. Comes in convenient 50-pound sacks—easy to place in special cartridge-shaped Eagle Wire Containers sized to fit all casings. Order through your jobber today.

These 3 Eagle Bearing Metals meet most requirements

Eagle Dreadnaught—for extreme speed and heavy-duty conditions.

Eagle Outlasta—for medium speed and average-load conditions.

Eagle Durable—for low speed and light-duty conditions.

EAGLE LEAD WOOL

Seals off Bottom Water—keeps 'em flowing!

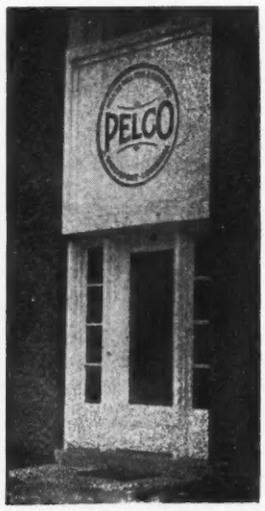
THE EAGLE-PICHER COMPANY

EAGLE Since EP 1843 PICHER

Chicago · Joplin · Cincinnati
Dallas · Kansas City

A bad omen

Many men are voluntarily in our armed forces because they like the life. This we can understand and approve. Too many other men are in service because they see their civilian contemporaries ensnared with political trammels, and this is a bad omen. They look with distrust on those millions of bureaucratic parasites who torment their benefactors with Rube Goldberg proclivities. American common sense always has won out, but just now we are altogether too patient. We have had too long a siege of the same political pestilence. Too many young men are not old enough to remember that bureaucracy is not a necessary evil.



WE'VE SUPPLIED OIL MEN IN OUR AREA FOR 39 YEARS

PELICAN WELL TOOL & SUPPLY CO.

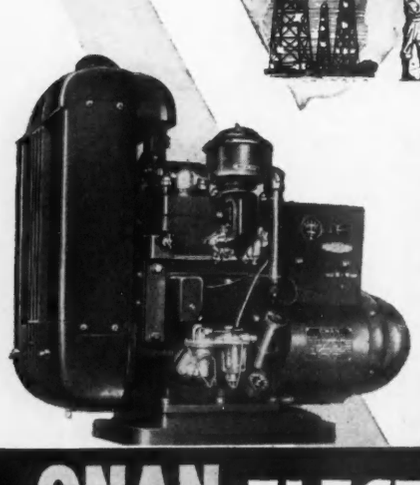
SHREVEPORT
LOUISIANA

PELCO

Berwick
New Iberia
Lake Charles

electricity

. . . . for every oil field job!



There's an Onan Electric Plant to meet the requirements of any oil field application—to give long, full-capacity service under the severest operating conditions.

Lightweight one or two-cylinder heavy-duty, air-cooled models for maximum portability. Onan two, four and six-cylinder water-cooled plants for continuous operation, stationary or mobile.

ONAN ELECTRIC PLANTS—A.C.—350 to 35,000 watts in standard voltages and frequencies; D.C.—600 to 10,000 watts, 115 and 230 volts. Battery chargers—500 to 6,000 watts, 6 to 115 volts. ONAN AIR-COOLED ENGINES—CK: 2-cylinder opposed, 10 h.p.; BH: 2-cylinder opposed, 5.5 h.p.; IB: 1-cylinder, 2.5 h.p.

WRITE FOR SPECIAL FOLDER

D. W. ONAN & SONS INC.
4744 Royalston Ave. Minneapolis 5, Minn.

ONAN ELECTRIC PLANTS

• South Louisiana

Cameron Parish Discovery Near Mud Lake Is Finaled

Discovery northeast of Mud Lake finaled; 2 new Tuscaloosa sand tests for Big Island field to be drilled by Phillips; casing set in Weeks Island deep test; producer at Four Isle dome reworked.

Cameron Parish: Magnolia Petroleum Company's Lutcher 1-C, gas-condensate discovery 4 miles northeast of Mud Lake in 24-14s-11w, has been completed. The well flowed 47 barrels of 43.2-gravity condensate and 3,716,000 cubic feet of gas on an 18-hour test, flow being through 12/64-inch choke. Total depth is 11,705 feet with casing perforated at 10,762-832 feet for completion. Rig is being moved to the Vincent Estate 1, 3400 feet northeast of the discovery.

Rapides Parish: Two new Tuscaloosa sand tests in the Big Island field will be drilled by Phillips Petroleum Company. Eota Realty Company 3 will be the south offset to Union Producing Company's John Tyler 1, second Tuscaloosa sand well completed in the field, and Smith 1 will be the south offset to Union's Belgard 1, Tuscaloosa sand discovery. Tuscaloosa production in the field is encountered at the 9600-foot level.

Iberia Parish: Shell Oil Company has set 7-inch casing in Smith State 3, Unit 1, Weeks Island field, site of world's record depth production. The test is being drilled with company tools and no details as to tests have been announced.

Seven-inch casing is set to 13,345 feet. Present production in the field is from the Miocene at the 13,500 and 13,700-foot levels.

Terrebonne Parish: The Superior Oil Company has reworked State 1, Unit 12 (was LLE Company 3), completed in January as the only producer in the old Four Isle Dome field. The well was originally completed January 26 for a potential of 135 barrels of oil daily through 8/64-inch choke from perforations at 8978-94 feet. On latest rework the well flowed 8 barrels of 44.6-gravity oil daily through ¼-inch choke through perforations at 8937-71 feet and with gas-oil ratio of 87,875/1.

J. S. Chamber Approves Natural Gas Act Changes

The Rizley bill for revision of the Natural Gas Act was given the support of the natural resources committee and board of directors of the U. S. Chamber of Commerce and will be submitted to the general membership for approval at the annual convention in Washington.

In support of the bill, the chamber will revise its long-standing natural resources policy to oppose government control of end-use or price of oil or natural gas as well as regulation of production.

The directorate also reiterated the chamber's long-standing policy favoring government encouragement of private enterprises in the foreign petroleum field, and re-adopted a policy statement inadvertently dropped during the war supporting continued and expanded activity by the Geological Survey and Bureau of Mines.

• North Louisiana

De Soto Parish Holly Field Outpost Prepares to Test

Holly outpost prepares to test; South Big Creek gets good producer; Rodessa deep test planned for Ashland field; third Smackover lime producer in prospect for Haynesville field.

De Soto Parish: A. W. Phillips was preparing to test oil shows in G. W. Samples 1, C NE NE NE 12-13n-14w, southwest of Holly field production. The oil sand was found at 2846-75 feet. The well went to 3155 feet. Production casing is cemented at 2953 feet.

Bossier Parish: Barnsdall Oil Company et al's Johnson 1, C NE SW SE 30-23n-12w, wildcat 3 miles northeast of Plain Dealing, had slight shows of gas from perforations in the Tokio and Annona chalk zones at 3075-95, 3105-18 and 2610-36, 2685-2700, respectively. The Annona will be acidized. Total depth is 7510 feet.

Franklin Parish: Burden & Kemp's Butler 1, 19-16n-8e, northwest diagonal offset to the South Big Creek field discovery, has been completed flowing 166 barrels of 41.1-gravity oil daily through 3/16-inch choke. Production is from the "Munson" sand through 144 perforations at 3388-406 feet. Total depth is 3409 feet. This is the fifth producer for the field.

Natchitoches Parish: The California Company will drill a deep test to the 6000-foot or Rodessa zone in the Ashland field. The new pay test is A. R. Johnson et al 1, 1-13n-8w. The field produces from the Detro sand at 3200 feet. Two other tests have been drilled in the area to 5323 and 5324 feet. The latter test, California's Annie Morrison 1, NE 12-13n-8w, reported shows of oil in the Rodessa at 5116-33 feet.

Claiborne Parish: Grady H. Vaughn's A. P. Milner 2, C NW SE 22-23n-8w, was nearing completion as the third Smackover lime producer for the Haynesville field. A flow of 211 barrels of 45.7-gravity oil through 5/32-inch choke for 16 hours was recorded. Production is from perforations at 9956-10,004 feet, with total depth to 10,329 feet.

Mississippi Landmen Meet

The annual meeting of the Mississippi Landmen's Association will be held in Jackson April 8. Election of officers will be held. Present officers are Brantley Jackson, Magnolia Petroleum Company, president; Bob R. Hart, Cities Service Oil Company, vice president, and C. H. Fisler, Tide Water Associated Oil Company, secretary-treasurer.

Sohio Buys Properties

Purchase of the Grady H. Vaughn properties in the Stephen-Smart and Gum Creek fields of Arkansas by Sohio Petroleum Company for $1,250,000 was completed April 1. Also involved in the sale were all undeveloped leases owned by Vaughn in both fields and the Dixie Pipe Line gathering system in the area. The wells purchased had a total pipe line run of 35,563 barrels of oil in January. Properties in the Stephens field were operated under the name of G. H. Vaughn, Jr., while the Gum Creek properties were operated under the name of Spartan Drilling Company.

BRIGGS & STRATTON
ENGINES
Preferred Power
the world over
FOR INDUSTRIAL, CONSTRUCTION, RAILROAD AND FARM EQUIPMENT
Year after year, during the 27 years of continuous production of air-cooled engines, Briggs & Stratton has constantly been first in developing and adopting the most advanced worth while engineering and production improvements. Through constant factory and on-the-job field study, by highly skilled engineers, Briggs & Stratton has always kept out in front — years ahead — in meeting the power requirements of equipment and appliance builders.
This experience is assurance of all that is best in gasoline power performance, as proven by the record established by more than 2¾ million Briggs & Stratton single cylinder, 4-cycle air-cooled gasoline engines— the record which has established them as "preferred power" by users, dealers and manufacturers the world over.
BRIGGS & STRATTON CORPORATION
Milwaukee 1, Wisconsin
Air-Cooled Power
4 CYCLE
BRIGGS & STRATTON
GASOLINE ENGINES

• Arkansas

Spirit Lake Field Outpost Prepares to Test Fault Zone

Spirit Lake outpost prepares to test fault zone; Lafayette County among state's few active areas; Union County wildcat still squeezing salt water inflows.

Lafayette County: Magnolia Petroleum Company's Lester Brothers 1, C NW NE 22-16s-25w, southwest outpost to the Spirit Lake field, has run casing to 4037 feet and was preparing to test. Total depth is 5467 feet. Lime was logged at 3915-35 feet, where a fault was crossed, and it is this section that was to be perforated for production test. It was believed that a showing of oil in the lime was in a cavity at the fault plane and that acidizing would bring commercial production.

Austin Stewart, H. G. Lewis, Jr., and Crow Production Company's Moore Heirs A-1, C SW NW 13-16s-25w, in the Spirit Lake field, indicated production in both the Paluxy and Kilpatrick lime horizons. Paluxy was topped at 3420 feet, Kilpatrick at 4072 feet, James at 4572 feet. Total depth is 4654 feet.

McAlester Fuel Company is starting operations at C. Lee A-1, C NE SW 24-17s-24w, Smackover lime wildcat in the Mars Hill area, on a Texas Company farmout.

Union County: McAlester Fuel Company's wildcat, J. H. Patterson A-1, C SE SW 19-18s-14w, was still testing. Several squeeze jobs have been run in an effort to shut off the inflow of salt water with shows of oil, as in last set of perforations at 3538-46 feet.

Miller County: Delta Drilling Company-Douglas Whitaker are drilling an offset to the discovery of the Texarkana field, Dildy-Johns 1, C E½ 4-16s-28w, on a Carter Oil Company farmout. The field, discovered in 1942, with a second well completed in September of last year, produces from the Smackover.

Hampstead County: W. R. Wright-Katherine Ryan's wildcat J. F. Shearer 1, C E½ SE NW 13-12s-26w, proposed 4000-foot test, was drilling at 2010 feet without shows. The 4000-foot depth is considered sufficient to test zones from the Tokio to the Smackover lime.

Annual Awards Established By Corrosion Engineers

The National Association of Corrosion Engineers, with headquarters in Houston, has established two annual awards in science and engineering pertaining to the field of corrosion. These awards, to be known as the Willis Rodney Whitney Award in the Science of Corrosion, and the Frank Newman Speller Award in Corrosion Engineering, will be presented for the first time at the annual NACE Corrosion Conference now in session at the Palmer House, Chicago.

The first recipients of these awards will be the men whose names they will commemorate and perpetuate. Dr. Whitney is thus honored for his fundamental work in the field of corrosion through his establishment of the electro-chemical theory of corrosion, while Dr. Speller will receive honor for his application of fundamental studies to practical engineering problems.

• Mississippi

New Pay Is Established for LaGrange Field, Adams County

New pay for LaGrange field in Adams County; extension in prospect for same field; deep test in Wayne County makes a duster.

Adams County: Texas-Pacific Coal & Oil Company's O. L. Wilson 2, SWc 8-6n-2w, has been dually completed to establish a new pay zone for the LaGrange field. With the field's regular production coming from the 6200-foot sand of the Wilcox horizon the upper section of the horizon was perforated at 4640-42 feet and on initial test produced a flow of 216 barrels a day through ⅛-inch casing choke. Casing pressure was 915 pounds. Later, casing was perforated at 6256-65 feet and 6267-71 feet in the regular producing zone and flowed 132 barrels of oil per day. The new pay is one of the shallowest Wilcox producers in the state since the greatest production from the horizon is attained at approximately 5800 feet in the Cranfield field.

LaGrange field was also in line for a ¼-mile southwest extension after successful tests in Big Chief Drilling Company-Sohio Petroleum Company's Parker G-107, 36-6n-2w. Cores from 6153-55 feet recovered 2 feet of saturated sand. A subsequent drill-stem test at 6151-55 feet recovered 15 feet of 38.6-gravity oil in a 5-minute test. Production string has been set. In the Pine Ridge field Phillips Petroleum Company's Mrs. Vic Artman 2, 36-8n-2w,

STRETCH **LIFE and SHRINK WEAR in Engines— USE**

MARVEL MYSTERY OIL

Oil field engines run long—and hot! Wear is greater, life is shorter—unless you give special care. Top cylinder lubrication is your easiest way to add years of extra service to the life of any engine.

Marvel Mystery Oil and the Marvel Inverse Oiler are positive protection for oft-neglected parts—in the vital upper-motor area! Extra-tough Marvel armors valves and guides with super-strong film that resists sizzling heat. Besides, Marvel cleans as it coats—strips off sticky gums and varnish—keeps internal surfaces cleared and clad for action.

Proper lubrication adds life and power, saves time and trouble. Ask for the facts. Emerol Mfg. Co., Inc., 242 W. 69th St., New York 23, N. Y.

use the **MARVEL INVERSE OILER WITH MARVEL MYSTERY OIL**

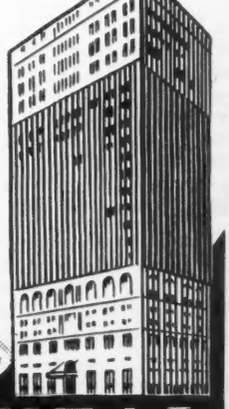
The Marvel Inverse Oiler, easily installed, proportions the flow of Marvel Mystery Oil precisely to the needs of your engine.

Kansas City's Smartest

WE STILL HAVE THAT GRACIOUS OLD-FASHIONED HOSPITALITY

Ideally located... superb service... finest cuisine... 22 floors of gracious living. Five rooms for food and entertainment: (1) Penquin Room (2) Sky-Hy Room (3) Omar Cocktail Lounge (4) The Alcove (5) The New Coffee Shop

R. E. McEACHIN, *Managing Director*



Hotel **CONTINENTAL**

ELEVENTH AT BALTIMORE

DIRECTION · SOUTHWEST HOTELS INCORPORATED · H. G. MANNING, FOUNDER

east offset of the discovery, was drilling at 9990 feet in shale after whipstock operation. Potential production will be encountered at approximately 10,000 feet, but so far no shows have been reported.

Wayne County: Humble Oil & Refining Company's G.M.&O. Land Company B-2, 24-9n-8w, deep wildcat, has been abandoned with no commercial shows. With total depth attained at 11,300 feet in the Lower Cretaceous, the well had slight shows of oil and gas at 9620-24 and 9621-26 feet in a drill-stem test, but further development failed.

Amite County: Gulf Refining Company's J. A. Rowland Trustee, A-1, 39-4n-2e, had slight shows of gas in the Upper Tuscaloosa. Zone was perforated at 10,907-13 feet and in 10½-hour test water cushion and 280 feet of gas-cut mud were recovered along with considerable salt water. Bottom hole pressure was 2175 pounds. On previous test of the Lower Tuscaloosa zone at 11,325-30 feet, the well had a weak blow and slight shows of gas. Perforations were being squeezed for further tests.

Jones County: Gulf's L. L. Majors 1, wildcat in SEc NE 29-6n-11w, is drilling below 10,667 feet. Reports indicate many shows of oil in the Lower Cretaceous. Cores from the vicinity of 9700, 9800 and 10,000 feet had small shows of heavy oil. Coring continued.

Jasper County: Union Producing Company's Ishee Unit 1, S&W NEc SE 28-10n-13w, has been completed for the first producer in the Soso field this year. Casing was perforated at 6681-86 feet and on initial test the well flowed at the rate of 7½ million cubic feet of gas per day through ⅜-inch tubing choke. Open flow potential is indicated to be 36½ million cubic feet of gas per day.

Alabama

Only active test in the state is Hunt Oil Company's T. R. Miller Mill Company 5, NW NE 1-4n-11e, Conecuh County, southeastern section of the state. The well is drilling below 7389 feet with no shows reported.

Florida

Gulf Refining Company's State 1, 2-67s-29e, Monroe County, was abandoned at 15,455 feet. There were slight shows of oil in dolomite, but in non-commercial quantities.

Palm Beach County: Humble Oil & Refining Company's Tuscon Corporation 1, SWc 35-43s-40e, is drilling below 8381 feet with no shows reported. Cores from 7656-766 feet recovered lime and anhydrite with no shows.

Collier County: Humble's Sunniland area test, Lee Cypress Company's 3, SE SE 28-47s-29e, is drilling below 11,370 feet with no shows reported during the week. Shows of oil previously had been reported in cores at 9950-54 feet and 10,320-22 feet.

In the Sunniland field, Humble's Gulf Coast Realty Company's 9, C SE¼ 24-48s-29e, is conditioning hole after 2 drill-stem tests at approximately 11,595 feet failed.

Alachua County: Tide Water Associated Oil Company's J. A. Phifer Estate 1, is drilling below 1762 feet after plugging back hole because of losing returns.

• Illinois Basin

Indiana Discoveries Likely; Kentucky Wildcat Swabs Oil

Three discoveries loom in Indiana; wildcat in Kentucky swabs oil; Bungay, Illinois, pool gets extension.

Indiana

Ashland Oil and Refining Company's Hart 1, NE NW SW 30-5s-13w, Posey County, is a tentative discovery of a new horizon for the Springfield pool. Operators set pipe for production test of Aux Vases sand at 2900-50 feet after running electrical log. Pool now produces from the Palestine sand.

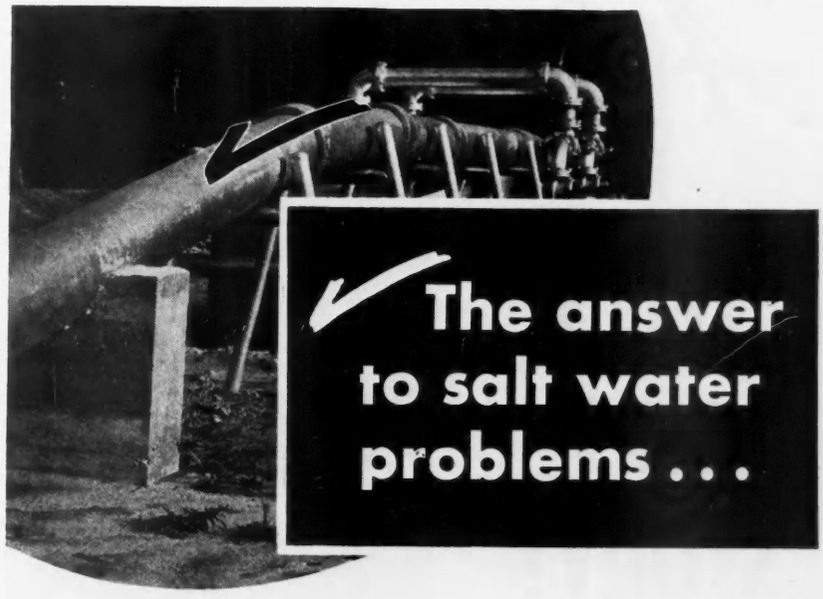
Calvert and Willis' Hastings 1, SW SW NW 10-8s-14w, a mile north of the College pool, flowed 100 barrels of oil in 5½ hours after 6000 gallons of acid in the McCloskey lime at 2675-90 feet. Tests continued.

Knox County: Ernest Zink and others' Halter 1, Lower Prairie survey, 2n-10w, near Vincennes and approximately 3 miles from production along the Wabash river, was running pipe for test of Rosiclare sand at 1815-25 feet. During a 1-hour drill-stem test the well made 105 feet of oil and 90 feet of oil-cut mud.

Illinois

F. J. Fleming and others' Odel Heirs 1, SW SW SE 10-4s-7e, Hamilton County, ¾-mile northwest of the Bungay pool, was running pipe to test McCloskey lime at 3450-55 feet. During a 1-hour drill-stem test, the well yielded gas in 2 minutes and then recovered 965 feet of clean oil.

Edwards County: Gilliam and Aspin's



TRANSITE Asbestos-Cement PIPE curbs corrosion inside and outside

TRANSITE PIPE provides salt-water disposal lines that oil men know will give them years of dependable service. Made of asbestos and cement, it withstands the corrosive action of salt water on the inside, corrosive soil on the outside . . . holds costly replacement to a minimum.

Transite has other advantages, too. Its factory-made Simplex Couplings speed assembly . . . provide joints that *stay* tight in service. Flexible, they permit laying the pipe around curves without special fittings. Light in weight, Transite is easily handled . . . most sizes can be unloaded and lowered into the trench without mechanical handling equipment.

Use Transite Pipe to save on installation . . . to reduce maintenance . . . to eliminate frequent costly pipe replacements on your salt-water disposal lines. For all the facts, write Johns-Manville, Box 290, New York 16, New York.

JOHNS-MANVILLE PRODUCTS

Johns-Manville TRANSITE PRESSURE PIPE

Goodburn 1, SW SW SE 4-2s-14w, a wildcat, is drilling below 3000 feet after a 1-hour drill stem test at 2820-37 feet recovered 30 feet of oil and mud.

Crawford County: Wallace Wright's Walters 1, wildcat in NE SW SE 19-7n-12w, is shut down for repairs prior to testing Salem lime at 1819-21 feet. The pay showed for 2½ barrels of oil per hour during swab tests.

Kentucky

The Pure Oil Company and Stanolind Oil & Gas Company's Hammons 1, 22-1-67, Clay County wildcat, was testing Knox dolomite after a 5000-gallon acid treatment, with pipe set at 3471 feet. The well gave 3 barrels of oil per hour after acid treatment. Total depth is 4002 feet, plugged back to 3693.

• Ohio

Lorain County Test Fails; Knox County Pool Extended

St. Peter test in Lorain is full of water; Brown has north extension; Woodsfield pool active; Jackson wildcat is failure.

Lorain County: Hanley and Bird's deep test in Russia township found only a small show of oil and gas in the St. Peter sand, along with 3000 feet of water. Trenton limestone was reported at 3498-4135 feet, St. Peter at 4146 feet, and the test was abandoned at 4157 feet.

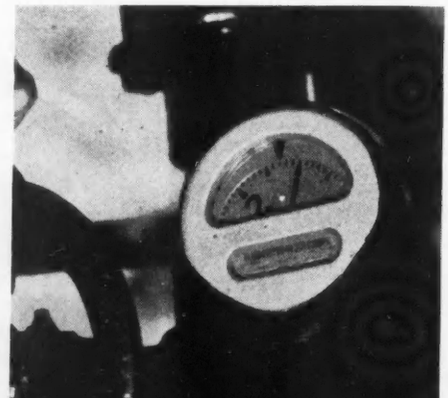
Knox County: W. L. Blakely moved ¼-mile north of his W. D. Frank 2 to the A. S. Richert 1, Lot 10, Brown township, and at 2 feet in the Clinton sand had 500,000 cubic feet of gas which was turned into the line for testing. Top of the Clinton sand was reached at 2697 feet.

Monroe County: The shallow pool southeast of Woodsfield remains active. H. G. Clymer's Enoch Craig 1-B, SE NE 21, reached the Berea sand at 1937 feet and at 1943 feet had 800,000 cubic feet of gas when a pin was lost. After fishing out the pin and drilling on the gauge increased to 1,200,000 cubic feet with bottom of the Berea at 1954 feet.

Jero Oil Company's Jane Jackson 3, SE SW 16, was stopped in the Keener sand at 1450 feet and shot with 30 quarts. After shot the well made 20 barrels of oil the first day.

Jackson County: The Ohio Fuel Gas Company's wildcat test on Lincoln Myers, SW NW 27, Jefferson township, had broken Clinton sand at 2710-22 feet and 30,000 cubic feet of gas at 2722-24 feet. The well was shot, but as it was only making 50,000 cubic feet in 2 hours it was plugged.

A Quick Glance



TELLS THIS STORY!

BIG, clear, STEADY figures and division marks stand out on the Cameron Mud Line Pressure Gauge so that it takes only a glance for them to be read *from across the derrick floor!* Uniformly steady pressure readings are provided by a dial cushioned against line vibrations. The self-dampening mechanism requires no adjustment for changes in pressure range. All internal parts work in oil, thus eliminating corrosion and wear.

Type "D" for rotary drilling rig service; Type "F" for core drills, cementing and acidizing units, etc.

See your Composite Catalog for complete details or literature will be gladly sent on request.

CAMERON IRON WORKS, INC.

P. O. Box 1212, Houston, Texas

Export: 74 Trinity Place, New York, N. Y. West Texas: Odessa, Telephone (1710). Oklahoma: 310 Thompson Bldg., Tulsa. California: 1442 Hayes Ave., Long Beach. Wyoming: 356 N. Wolcott St., Casper. North Louisiana: Bossier City, (P. O. Box 425).

Cameron PRESSURE GAUGE

• Michigan

Five Exploratory Starts On List of 13 Permits Granted

Thirteen drilling permits approved by the Department of Conservation boost year's total to 124 compared with 131 for a like period last year. Five of the new starts are exploratory tests. These include the following:

F. W. Kehlet's Olson 1, NE NE SW 28-1n-16w, Allegan County; Scott and Bell's Eddy 1, NW NW SE 3-15n-6w, Isabella County; C. E. Weller's State 1, SE SW SE 16-20n-12w, Lake County; C. W. Teater's Keilholtz 1, SE NE SE 11-13n-8w, Mecosta County; and Oil Producer's Blanchard 1, SW SE SW 1-1s-13w, Van Buren County.

Newaygo County: Michigan Devonian Petroleum Company's Corey 1, NE SW NE 16-16n-11w, outpost 6 miles north of Woodville oil field, was being equipped to pump after logging 2700 feet of fluid, estimated 30 percent water, in the Traverse at 3068-98 feet.

Roscommon County: Sun Oil Company was setting 5-inch casing at 4115 feet on State D-1, C NE SE 24n-1w, preparatory to deeper drilling with spudder.

7500-Foot Test Projected in San Simon Valley, Arizona

A second wildcat has been assured the San Simon valley with the leasing of 6000 acres of land by Clifford E. Haines of Kalispel, Mont., for a 7500-foot test well to be drilled four miles due west of San Simon, Ariz.

Haines, a rancher and member of the Montana Legislature, and who also has extensive oil interests in eastern Montana, leased the property from George F. Sicks, former Army engineer who divides his time between Los Angeles and San Simon, where he operates a cattle ranch.

Haines has agreed to erect an all-steel derrick, a diesel-powered rig and to be ready to drill on or before August 1. The drilling site is about 100 yards southwest of State Highway 86, main artery between Tucson and Lordsburg, N. M.

The M. D. K. Fitzwater well, 5 miles southeast of the new project and on a 10,000-acre block, is expected to resume

drilling soon. A broken rotary table caused a shutdown. This will be replaced and another diesel engine added to power the drawworks. The Fitzwater test, now at 4160 feet, has consistently shown oil filaments and gas bubbles, and at 1995 feet showed a saturated oil sand. This test is in the Abrigo limestone, beneath which another pay zone is expected.

• Rocky Mountain Area

Herrick Dome, Wyoming, Offset Is Low in Tensleep

Offset to Wyoming's Herrick Dome discovery is low in Tensleep; Natrona County test planned; tests being completed in South Fork discovery; test projected on northweast side of Rangely field, Colorado.

Wyoming

The Superior Oil Company's second well on newly-discovered Herrick Dome, Albany County, 15 miles west of Laramie, found the Casper (Tensleep) formation 116 feet lower structurally than the discovery well, and is drilling water sand in that section. The well is Herrick 2, SW SE SW 1-16n-76w, ¼ mile southwest of the discovery. Casper was topped at 3625 feet and saturated sand was found at 3744 feet. The well is below 3771 feet, but casing will be run soon and tests in the upper section of the sand. Superior has not marketed crude from this field since completion of the discovery well 2 months ago pumping 225 barrels of 21-gravity oil in 15 hours.

Natrona County: The British American Oil Producing Company has let contract to Brinkerhoff Drilling Company of Casper for a 3500-foot test at Natrona Unit, 22 miles northwest of Casper. The test is on a 4000-acre unit and will be in NE NE SW 27-36n-83w. The contract depth should test Frontier sands, but the well probably will be carried deeper as a Sundance formation test.

Washakie County: At its South Fork discovery well General Petroleum Corporation was moving out a rotary preparatory to acidizing and completing testing. A week earlier this well swabbed 23 barrels of 29-gravity oil in 2 hours from the Embar formation, 10,046-125 feet, after plugging back from 10,900 feet, total depth, in the Madison. Seven-inch casing, which had been cemented through the Embar, was perforated with 98 holes and the zone was acid washed with 2000 gallons. Probably another 20,000 gallons of acid will be used on the formation before testing is resumed. In the Worland field, 12 miles north of South Fork, The Pure Oil Company has 3 wells completed in the Embar formation and has acidized each with more than 25,000 gallons. Initial production following acidizing on the Worland field wells was more than double the natural production. Discovery of oil at South Fork gives the southeastern Big Horn Basin 3 deep fields discovered primarily by geophysical methods within a year.

Colorado

Road is being cleared by Continental Oil Company for an interesting test on the northwest side of the Rangely Field. The well will be R. Hall 1, C SE SE 5-2n-103w, Rio Blanco County, 2 miles northwest of production in the field proper. Continental has a large block of leases on the northwest side of Rangely and the present test will assist in evaluating this acreage. According to the U. S. Geological Survey maps of the area, a large fault crosses the axis of the Rangely field anticline between the Continental location and the field proper, and Continental considers trap possibilities of lower beds against this fault of sufficient value for the test.

Continental recently completed the second dry hole in the Rangely field at Rooth 4, C NW NW 22-2n-103w, after finding Weber at a minus datum of 1142 feet. There was some saturation in the upper few feet of Weber, but testing on the well failed to find commercial production. Continental's Rooth 3, C NE NE 27-2n-103w, is also a near-abandonment after failing to find saturation in the Weber, and the company is perforating opposite the Shinarump formation at 5960-6010 feet.

Delta Drilling Company and Mountain States Oil Company's extension test 2½ miles east of the Rangely field at Kenney 1, SW NW SW 34-2n-101w, is drilling below 4560 feet in the Morrison. This well is also based on fault trap possibilities in the area. Recently Stanolind Oil & Gas Company completed an east extension to the field at Pepper 1, SW SE NW 31-2n-101w, and this test is now swabbing at the rate of 40 barrels of oil per day. The well tested salt water in the lower Weber section at 6377 feet, total depth, and was plugged back to 6299 feet where the operator continues testing.

Use Acme Cable Tools

Trustworthy Since 1900

Acme Wire Line Cutting Outfit

assures the cleanest-cut, quickest, safest means of parting drilling cable from a string of stuck tools . . . A known fact — based on years of stern field-tested service — as verified by its many satisfied users.

Designed and patented by a noted, practical, old-time operator, this unique outfit is an Acme favorite . . . Possesses ALL the correct-steel, proper heat-treatment safeguards and precision-engineered craftsmanship that have made Acme Tools famous: for your trustworthy use.

An exclusive feature is the Wire Line Knife's cutter arrangement — cutter-edges so spaced that each cuts a separate strand, but the cable is ALL severed with ONE bite. Thus avoiding frayed ends. Cutters of toughest known tool steel. (This outfit, less cutters, may be used as jar bumper — sometimes freeing stuck tools, without cutting cable.)

Outfit consists of Knife (Fig. 179), Jars, Sinker and Rope Socket — run in this order. Two tool wrenches furnished. . . . Cuts any size line, in any hole 4" and up. Special sizes made for tubing use. (With simple precautions, the outfit is run without wrapping. See our catalog instructions.)

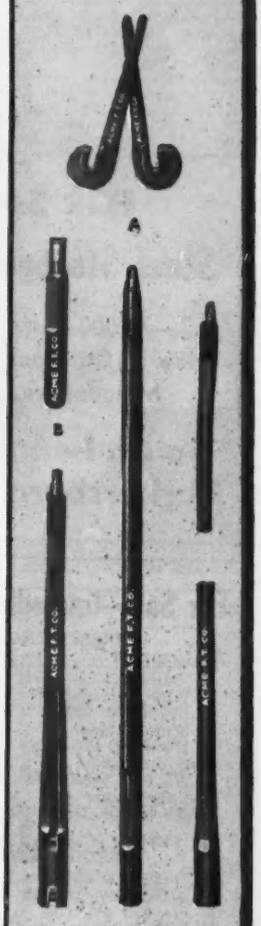
Shown here is W.L. Cutting Outfit, complete —fashioned to Acme's rigid requirements— for your more profitable use.

Fig. 179
Acme Wire Line Knife Cutters

Fig. 180
Cover Plate

For more information, see our 24-page Catalog in Composite Catalog (Vol. 1). Or tell us your needs, by TODAY'S mail.

In Acme Tools, There's More of EVERYTHING You Need



A—Tool Wrenches
B—Rope Socket
C—Wire Line Knife
D—Long Stroke Jar
E—Sinker

Acme Fishing Tool Co.

PARKERSBURG, W. VA.

Export Office: 19 Rector St., New York 6, N. Y.

ACME DRILLING & FISHING TOOLS Since 1900

The Oil Weekly's TRADING POST

CLASSIFIED ADS — SERVICES - PERSONNEL USED EQUIPMENT

Rates: Regular classified (undisplayed) set in this size type: 7 cents per word for first insertion and 5 cents per word for each succeeding insertion of same copy. Displayed advertisements, set in suitably larger type with ruled border, $5 per inch for first insertion and $4 per inch for succeeding insertions same copy. **All classified ads payable in advance.** Send copy and checks to: Trading Post Section, The Oil Weekly, P. O. Box 2608, Houston, Texas.

FOR SALE

■ Cardwell K. L. Double Drum Rotary Drawworks, GAK 145 Waukesha engine, perfet condtion, can be seen operating at Luling, Texas. P. O. Box 709, Phone 596, Conroe, Texas.

■ FOR SALE—Well service unit Diamond T truck with "H" Cardwell unit and mast—SRKR, Waukesha motor with tubing and rod tools. Excellent condition. Also one Ideco 5060 super unit with mast. Also excellent condition. The Cavins Corp., 3408 McKinney, Houston, Texas.

■ Lumber for Sale: 3x6 and wider 10 to 16 rough oak $58.00. E. J. Galennie Lumber, Box 1074, Shreveport, Louisiana.

■ 5 Complete Reda Pumping Units. Cables like new, 75 and 97 H.P. Motors. Max Steinbachel, 1905 Park Place, Wichita 4, Kansas. Phone 5-6082.

■ FOR SALE—1 Allis-Chalmers UM Pulling Unit with mast and tools, mounted on 1941 Ford truck, all in good condition. A. Hoipkemeier, 719 E. 13th St., Ada, Okla.

FOR SALE

Steel Storages Tanks

7—72,600 barrel capacity
Now on Our Tank Farm near
Morgantown, W. V.

South Penn Oil Co.
Parkersburg, W. Va.

For Sale—Immediate Delivery

DIESEL ENGINES

2—Winton Model 1920 94 HP @ 300 RPM	3 cyl	10" x 14"
3—Winton Model 1290 120 HP @ 250 RPM	3 cyl	12½"x16"
9—Winton Model 1580 170 HP @ 270 RPM	3 cyl	14" x 16"
1—Busch 3DF17 175 HP @ 300 RPM	3 cyl	13" x 17"
2—DeLavergne 250 HP @ 270 RPM	4 cyl	14½"x13"

PUMPS, HORIZONTAL DUPLEX RECIPROCATING

24—Prescott 6"x24" capy. 20,000 bbls. per day 800#
13—Prescott 4⅝"x18" 9,000 bbls. per day 800#

GENERATORS, DIRECT CURRENT

21—Allis Chalmers 25 KW 125 Volt Belt Driven
2—Westinghouse 25 KW 125 Volt Belt Driven
9—Allis Chalmers 15KW 125 Volt Direct Connected to Model CSR6 gasoline engine

COMPRESSORS, AIR

8—Ingersoll-Rand, Type 20, two stage, 5"&2½"x4", with 7½ HP Allis Chalmers direct current motors

Also water circulating and sump pumps, direct current motors and motor starters ½ to 7½ HP, switch boards and other items.

H. F. SWINDLE, Purchasing Agent
Great Lakes Pipe Line Company
Kansas City 13, Missouri
P.O. Box 2239 **Phone Grand 2160**

FOR SALE

■ For Sale: Gravity meter in perfect condition. Priced for immediate sale. Address: Box 23, c/o The Oil Weekly, Houston, Texas.

■ 2—Complete Mobile Casing Pulling and Swabbing Rigs for sale—Double acting hydraulic jacks and automatic break out tongs, Wilson Mfg. Co. equipment including 10,000# hydraulic pump. Call or write Oil Field Services, Inc., 625 Baronne Street, New Orleans, L. Tel. CA 2280.

■ 32'x10'x3'-6" draft—New all steel work and crew boat. Controls inside. Capable carrying 16 men in cabin. Large deck space forward and aft of cabin. 130 HP Kermath, 18 Mph. Guaranteed. Ideal for large lakes, rivers and swamps. TECHE STEEL WORKS, INC., New Iberia, Louisiana.

HELP WANTED

■ WANTED: Plant Superintendent capable of supervising natural gasoline plant construction and operation in Arkansas. Position with new company, excellent possibilities for greater responsibilities. State qualifications, previous experience and salary expected. Address: Box 22, c/o The Oil Weekly, Houston, Texas.

■ WANTED: Graduate engineer with at least ten years practical operating experience in refinery of less than 20,000 barrels capacity. Must have excellent scholastic and business experience; good health, under 45 years old. Prefer graduate chemical engineer, who is practical, conservative and energetic. Strong personality with native ability to handle men required. Good, permanent position open with strong and reputable company in South Texas refinery. Replies will be held in strict confidence. Address: Box 24, c/o The Oil Weekly, Houston, Texas.

ARCHITECTURAL DRAFTSMAN AND STRUCTURAL DRAFTSMAN—Experience in the design and construction of service stations and oil bulk plants preferred. Major petroleum company in Chicago. Give complete details first letter. Address: Box 27, c/o The Oil Weekly, Houston, Texas.

Major oil company has good opportunity for experienced Seismic Computer. College graduate preferred; central location. Please give age, education, experience and status of availability in first letter. Address: Box 19, c/o The Oil Weekly, Houston, Texas.

WANTED TO BUY

■ Wanted to Purchase: A used Schmidt type vertical intensity field magnetometer in good condition. Address Box 20 c/o The Oil Weekly, Houston, Texas.

■ WANTED — One Amerada pressure bomb 1¼" O.D. 4000# element complete with clock and accessories. Engineering Service Co., Inc., P.O. Box 3094, Corpus Christi, Texas.

■ WANTED TO BUY: 500 feet 2⅜" flush joint drill pipe used or new. Rotary drill rig mounted on truck good for drilling to 3,000 feet. James H. Feese, 1311 East Third St., Casper, Wyoming.

SITUATIONS WANTED

■ TITLE ATTORNEY—over twelve years experience, desires connection with oil company or individual in Oklahoma. Box 5205, Farley Station, Oklahoma City, Oklahoma.

■ GAS ENGINEER, mechanical graduate, desires connection with San Antonio firm. Experienced in plant design and construction, and machinery, valves and piping sales. Address: Box 26, c/o The Oil Weekly, Houston, Texas.

■ PETROLEUM ENGINEER. Danish graduate engineer, age 27, married, interested in position as supervisor in oilfield, pipe-lining, or exploratory work in EUROPE, THE MIDDLE EAST or SOUTH AMERICA. Two years experience with large American oil company. Speaks English and German perfectly, knowledge of French, Spanish, and Italian. Address: S. A. Schaumburg-Jensen, Sophiendal, Skanderborg, Denmark.

LEASES, DRILLING, ACREAGE, ETC.

■ FLORIDA ACREAGE—Large tracts cut-over and young timber land for sale in fee. Box 2191, Orlando, Florida.

■ JOHN O. BANKS pays top prices for producing royalties, 302 Gilbert Bldg., Beaumont, Texas.

If interested in oil and gas leases close up to production in the big gas-distillate field of Shelby County, I have a new 35-acre and a 218-acre lease, production on adjoining tract, price $10 per acre. C. A. Parker, Box 451, Center, Texas.

INVESTORS

Independent Geological and Geophysical organization completely equipped and staffed, is seeking finance to purchase royalties in advance of drilling known structures. Have surveyed for Majors many oil pools in advance of the bit. Also leasing blocks to be drilled with our own equipment. All plays in States of Michigan, Ohio, Indiana, in which we have maintained field offices and scouts for the past ten years. Correspondence invited. Address: Box 16, c/o The Oil Weekly, Houston, Texas.

OIL and GAS LEASES FOR SALE

In Lea, Eddy, Otero, Chaves, Roosevelt, DeBaca, and Curry Counties, New Mexico.

ALSO PRODUCING WELLS FOR SALE located in Loco Hills and Turkey Track Areas, Eddy County, New Mexico.

Write for exact locations and other information—Robert E. McKee, General Contractor, P. O. Box 562, El Paso, Texas.

NOTICES

Owner of a $250,000 modern, well-equipped steel fabricating plant in Houston industrial area desires two associates: one a skilled steel fabricator and the other a first class steel salesman well and favorably known in oil and building circles. $100,000 minimum investment and excellent references required. Write or wire Box 25, c/o The Oil Weekly, Houston, or Telephone La Porte 4692.

ARKANSAS WILDCAT

Miller County: E. A. Gabriel's Paul Martindale 1, c nw nw 32-14s-28w, Paluxy 2400, Glenrose 3123, base Massive Anhydrite 3596, Cotton Valley 4985, abnd 3-20-47 at 5415.

CALIFORNIA WILDCATS

Kern County: Mace Cox's No. 1 24-26s-18e, Antelope Plains area, abnd 3-26-47 at 790.

British-American's U. S. Government 66-20, Antelope Plains area, abnd 3-26-47 at 2731.

Seaboard Oil Co.'s Furhman 3, 28-28s-28e, Kern River area, abnd 3-28-47 at 4025.

ILLINOIS WILDCATS

Bond County: R. McFarland's Sharp 1, c ne sw 28-6n-3w, abnd 992.

Clay County: A. J. Hammer's Rothwell 1, se sw nw 22-3n-6e, abnd 3152.

Cumberland County: Texas Co.'s Gibbons 1, 35-9n-7e, abnd 2613.

Lawrence County: Paul Graehling's French 1, sw se sw 35-3n-13w, abnd 2479.

Saline County: C. E. Brehm's Lewis 1, sw sw nw 11-9s-5e, abnd 2840.

Wayne County: O. C. Borah's Jones 1, nw sw se 11-1n-5e, abnd 3082.

White County: Pure's Stephens 1, nw nw nw 33-5s-9e, abnd 3236.

INDIANA WILDCATS

Gibson County: S. D. Jarvis' Jones 1 15-3s-12w, abnd 2636.

Posey County: E. P. Jarvis' Hartman 1-A, 27-6s-12w, abnd 1169.

Vic & Van Operating Co.'s Carr 1, ne sw sw 29-4s-13w, abnd 2240.

KANSAS WILDCATS

Ellis County: J. C. Farley's Wisener 1, se se se 26-13s-20w, abnd 3815.

Greenwood County: Lee Oil et al's Morton 1, cs½ sw sw 2-28s-12e, abnd 1337.

Pratt County: E. Paul Hatfield's Keeler 1, se ne ne 7-28s-12w, abnd 4545.

Sumner County: Anderson Prichard Oil Corp. et al's Sylvester 1, ne nw sw 35-31s-1w, abnd 4135.

KENTUCKY WILDCAT

Daviess County: Ryan Oil Co.'s Waitman 1, 6-P-29, abnd 1824.

SOUTH LOUISIANA WILDCATS

St. Bernard Parish: Calif. Co.'s Biloxi Marsh Lands 2, 25-12s-16e, Point Aux Marchettes area, abnd 3-21-47 at 9600.

St. Mary Parish: Humble's Rose Phillips Feitel et al 1, fr sec 12-18s-11e go wly alg sl 990 th nly parallel to el 990 to lcn in 12-18s-11e, at mouth of Atchafalaya River on ne side Chiltrus Prospect 6 mi w sw Deer Island prod, abnd 3-20-47 at 11,920.

Humble's State-Hogg Bayou Lse 732-1, lcn in Atchafalaya Bay, Hogg Bayou area, T-18s-11e, abnd 3-24-47 at 13,423.

MICHIGAN WILDCATS

Arenac County: Don F. Rayburn's Mutch 1, nw sw nw 1-19n-3e, Dundee 2938, abnd 3-20-47 at 3087.

Bay County: Lincoln Drlg. Co.'s Boeing 1, ne nw ne 23-18n-3e, Dundee 2880, abnd 3-22-47 at 3033.

Clinton County: C. W. Teater's Jones 1, ne ne nw 2-6n-3w, Traverse 2488, abnd 3-19-47 at 2494.

Newago County: H. E. Walton's Schmaker 1, nw ne ne 21-12n-12w, Montore 2863, abnd 3-28-47 at 2950.

Osceola County: Union and Americrude's Cody 1, ne sw se 16-17n-9w Dundee 3647, abnd 3-29-47 at 3764.

Ottawa County: C. A. Perry's Arens 1, se nw nw 26-6n-15w, Traverse 1614, abnd 3-25-47 at 1629.

Tuscola County: E. E. Brehm's Begle 1, ne ne ne 21-10n-7e, abnd 3-30-47 at 3131.

MICHIGAN NEW PAY TEST

Osceola County—Reed City Field: Ohio Oil Co.'s Steadman 1, c nw nw 29-18n-10w, abnd 3-20-47 at 5090.

OHIO WILDCATS

Ashland County: Ohio Fuel Gas Co.'s W. E. Mayes 1, Lot 87, Sullivan, no Clinton sand, abnd 3-18-47 at 2636.

Jackson County: Ohio Fuel Gas Co.'s Lincoln Myers 1, sw nw 27, Jefferson, Clinton, abnd 3-26-47 at 2720.

Lorain County: Hanley and Bird's Wm. Seabold 1, Lot 36, Russia, St. Peter, abnd 3-28-47 at 4157.

OKLAHOMA WILDCATS

Carter County: R. M. Johnson's Sykes 1 ne se nw 2-4s-2w, abnd 1101.

Choctaw County: Cargill Brothers' Callary 1, se se sw 23-7s-15e, abnd 626.

J. L. Cargill's Murray 1, nw ne nw 35-7s-15e, abnd 642.

Cleveland County: Dearing's Rookstool 1, c nw nw 10-9n-1e, abnd 6455.

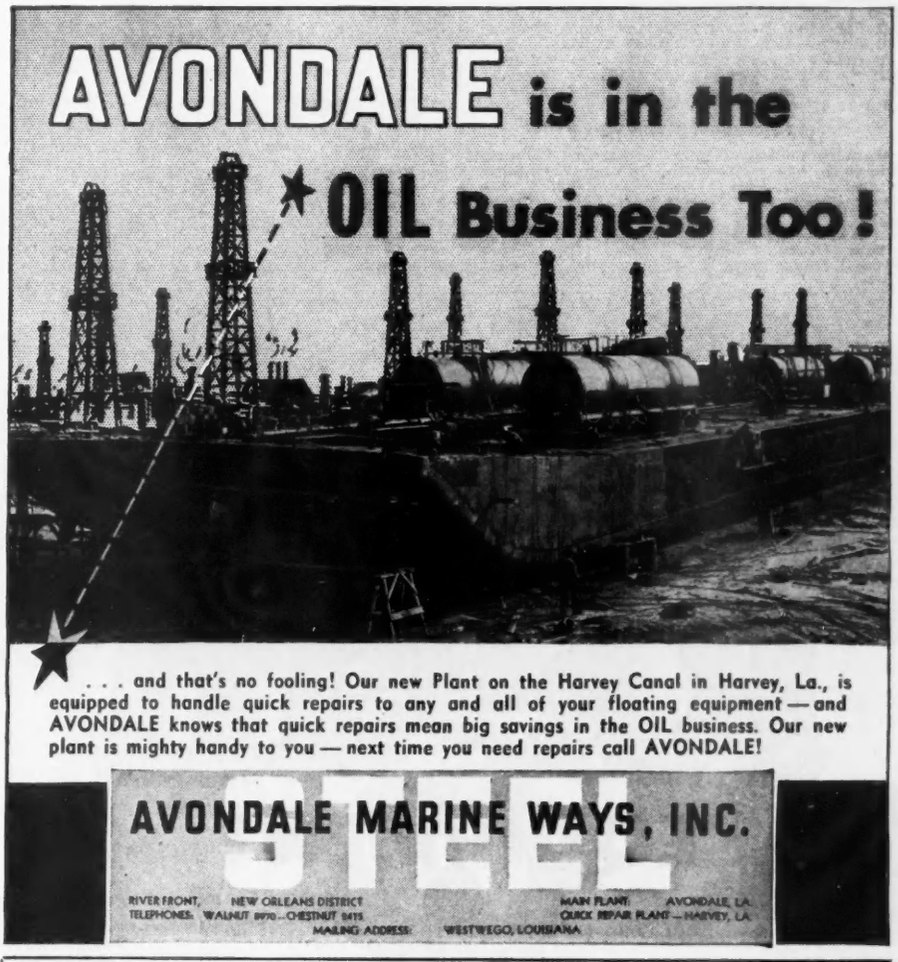
Cotton County: L. H. Choate's Wilson 1, sw w ne 34-3s-10w, abnd 1620.

R. W. Sleimaker's Scruggs 1, sw 18-4s-10w, abnd 1812.

E. P. Griffin's Scruggs 2, se se nw 21-4s-11w, abnd 1234.

Taylor et al's Parke 1, nw nw ne 23-4s-11w, abnd 1600.

George Proctor et al's Hern 1, nw nw se 24-4s-11w, abnd 2133.



. . . and that's no fooling! Our new Plant on the Harvey Canal in Harvey, La., is equipped to handle quick repairs to any and all of your floating equipment — and AVONDALE knows that quick repairs mean big savings in the OIL business. Our new plant is mighty handy to you — next time you need repairs call AVONDALE!

AVONDALE MARINE WAYS, INC.

STEEL

RIVER FRONT, NEW ORLEANS DISTRICT — MAIN PLANT, AVONDALE, LA.
TELEPHONES: WALNUT 8970—CHESTNUT 9415 — QUICK REPAIR PLANT—HARVEY, LA.
MAILING ADDRESS: WESTWEGO, LOUISIANA

DAN L. CLARK W. M. AVERILL RUPERT COX

DAN L. CLARK
DRILLING CO.

Drillers of

OIL AND GAS WELLS

•

POWER AND STEAM RIGS

NIXON BUILDING

CORPUS CHRISTI, TEXAS

Local 7746-7747 Long Distance 95

Morgan Brown's Rose 1, se se ne 25-4s-11w, abnd 1610.
R. E. Barbre et al's Goode 2, nw nw nw 28-4s-11w abnd 1333.
Jefferson County: Ryan Construction Co.'s Seay 1, nw sw ne 5-7s-5w, abnd 3012.
Love County: Seitz & Seitz's Whitmore 1, se se sw 7-6s-2e, abnd 2254.
Pawnee County: Mohawk Drlg. Co.'s Gilbert 1, sw sw ne 20-22n-3e, abnd 4411.
Payne County: J. J. Fleet et al's Switzer 1, se se sw 9-18n-3e, abnd 4105.

NEW MEXICO WILDCATS

Chaves County: Kerr-McGee Oil Industries' Reid 1, 1880 snl 560 ewl 8-13s-30e, elev 3848, salt 530-1105, Yates 1160, Red Sand 1935-50, San Andres 2520, abnd 3-23-47 at 3144.
Torrance County: Eidel Mfg. Co.-Miller & Miller's Mitchell 1, 847 snl 2250 wel 33-4n-8e, elev 6351, Pennsylvanian 2090, abnd in granite 3-22-47 at 3592.

WEST TEXAS WILDCAT

Hockley County: Geo. P. Livermore's Moore-Texaco 1 510 out sec lbr 18, lge 721, State Capitol Lands, elev 3511, anhydrite 2200, San Andres 3780, abnd 3-24-47 at 4837.

WEST CENTRAL TEXAS WILDCAT

Tom Green County: Palmer Oil Corp.'s Oates 1, c sw sw S. P. Ry. 52, Dist. 11, elev. 1886, Palo Pinto 4290, Ellenburger 5407, abnd 3-25-47 at 5846.

NORTH CENTRAL TEXAS WILDCATS

Jones County: McCarthy O&G Corp.'s Connell 1, 1716 nsl 330 wel T&NO Ry. 4, blk 2, elev 1740, Ellenburger 5215, abnd 3-26-47 at 5545.
Throckmorton County: Blackwell O&G Co.'s Higgs Unit-Everett 1, 467 out nec sect 2240, TE&L Co. sur, elev 1219, Palo Pinto 1982, Capps 2582, Bend 3812, Barnett 4555, Mississippi 4605, abnd 3-19-47 at 4653.
Panhandle Ref. Co.'s Burgess 1, 467 snl 330 ewl s½ sect 3045, TE&L Co. sur, Bend 4339, Mississippi 4862, abnd 3-31-47 at 5032.

NORTH TEXAS WILDCATS

Clay County: Hedrick Oil Co.'s Chapin 1, 330 out nec blk 81, Byers sbdn, Canyon 2022, abnd 3-15-47 at 2074.
Cooke County: J. F. Dow et al's Newman 1, 330 snl 2300 wel C. Collingsworth sur, abnd 3-16-47 at 2609.
Wilbarger County: Buffalo Oil Co.'s Smith 1, 2312 nsl 980 ewl H&TC Ry. 14, blk 14, elev 1263, Canyon 3879, abnd 3-22-47 at 4560.
Young County: Butler & Horany's Dwight 1 1000 snl 970 ewl sect 1442, TE&L Co. sur, abnd 3-13-47 at 722.
Panhandle Ref. Co.'s Kay 1, 660 snl 933 ewl sect 1930, TE&L Co. sur, elev 1207, Bend 4041, Mississippi 5043, abnd 3-25-47 at 5165.

TEXAS PANHANDLE WILDCAT

Gray County: Phillips' Johnson-Updegraff 1, 330 out sec sect 13, Rockwall CSL sur, elev 3006, abnd 3-12-47 at 3100.

EAST CENTRAL TEXAS NEW PAY TEST

Grayson County—Handy Field: L. O. McMillan and Sherman Hunt's Thorn 2, 990 w 4250 n of nec of A. Burns sur, but in S. Stewart sur, elev 739, abnd 3-21-47 at 8004.

NORTHEAST TEXAS WILDCAT

Cass County: W. A. Patterson's J. C. Turner Est. 1, 660 fr nl 466 fr el 61-ac Odis Turner lse, Soloman Hines sur, 1½ mi w of Avinger, abnd 3-15-47 at 3212.
Houston County: Daniel Oil Co.'s Boykin 1, 660 fr swl 833 fr nwl 100-ac tr, or 833 fr nwl 13,550 fr swl Jacob Prewitt sur, elev 437, Midway 3220, Pecan chalk 4760, Austin 5550-5822, Woodbine 5829, abnd 3-25-47 at 5944.

SOUTH CENTRAL TEXAS WILDCATS

Atascosa County: McFarland Drlg. Co.'s Henrietta Krisch Est. 1, 1400 fr nwl 3100 fr nel Jurgen Dierks Sur 1207, 3 mi n of Poteet, 490-ac lse, abnd 3-6-47 at 4095.
McMullen County: W. W. Hawkins' Nueces Ld. & Livestock Co. 2, 1655½ fr nwl 1111 fr nel John T. Moorehead sur 234, 1040-ac lse, 5½ mi n Munson fld, abnd 3-17-47 at 917.
Wilson County: Sam E. Wilson, Jr.'s Bruno Johns 1, 1950 fr nel 1000 fr sel 1250 fr nwl 740-ac lse, 6300 ne U. S. Highway 181, S. & J. de Arocha Gr, abnd 3-21-47 at 3595.

SOUTHWEST TEXAS-LOWER COAST WILDCATS

Cameron County: Guldrus Drlg. Co.-Geo. Echols' Al & Lloyd Parker 1, 660 fr nel 885½ fr sel blk 177, San Benito Ld. & Wtr. Co. sbdn and 418.97-ac lse, Concepcion de Carricitos Gr abnd 3-24-47 at 8794.
Duval County: Texon Royalty Co.'s Servando Benavides Heirs 1, 330 fr se&nel lot 46, O'Hern-Seacord sbdn, El Mesquite Gr, 1142.2-ac lse, e of O'Hern fld, abnd 3-9-47 at 3568.
Bridwell Oil Co.'s A. G. Villareal 1, 330 fr nl 6100 fr el San Andres Gr, 2 mi e of n end of Benavides fld, 330 fr nl 2130 fr wl 1200-ac lse, abnd 3-20-47 at 2740.
Webb County: Gravis & Mitchell's A. M. Bruni Est. 1, 330 fr n&el blk 36, Brown sbdn Albercas Gr on 720-ac lse, 1 mi nw Albercas fld, 1 mi e of n end of Glen fld, 1½ mi sw N. Albercas fld, abnd 3-17-47 at 2384.

UPPER TEXAS COAST WILDCATS

Brazoria County: McCarthy O&G Corp.'s Zula W. Loggins et al 1, start m/nly/nwc 80.77-ac lse go 441.29 se alg swl th 330 ne at ra. J. H. Bell Lge, abnd 3-25-47 at 10,089.
Harris County: Wright Drlg. Co.'s Mary Schumacker 1 start nwc WCRR sur, sect 13, th 330 w 660 s to lcn, 1½ mi s of wly prod in Bammell fld, 150-ac lse, abnd 3-23-47 at 7505.
Washington County: Magnolia's Chas. Reue 1, 547 fr ne&swl 858 fr sel 102-ac lse, Nester Clay Lge, of se flk Old Clay Creek Dome, abnd 3-21-47 at 9019.

MIDDLE TEXAS COAST WILDCATS

Gonzales County: Quintana Pet. Corp. et al's Alfred Speickermann 1, 335 fr swl 1282 fr nwl 145-ac lse, Wm. Newman sur, abnd 3-10-47 at 12,870.
Karnes County: W. E. Kinnear's E. Dittmar 1, 1350 sw alg sel T. W. Uzzell sur, fr e cor th 467 se at ra to lcn, 250-ac lse, Brooks & Burleson sur 1, 1½ mi e ne Runge fld, abnd 3-21-47 at 7119.
Victoria County: Wiegand Bros.-Ralph E. Fair's J. V. Vandenberge 1, 467 fr swl 900 fr nwl 883.3-ac lse, and SA&MG sur 2, 2 mi se Teleferner fld abnd 3-17-47 at 3015.

WYOMING WILDCAT

Fremont County: Sinclair Wyoming's Unit 1, ne ne nw 35-39n-91w, Lysite Unit, Mesa Verde 6264, abnd 3-22-47 at 12,610.

WYOMING OUTPOST

Weston County—Mush Creek Field: R. G. Martin's Gov't. 1, ne ne nw 34-45n-63w, 2 mi n prod, Newcastle 3610, abnd 3-27-47 at 3720.

EXCLUSIVE MID-CONTINENT REPRESENTATIVES: Hunt Tool Company, P. O. Box 1436, Houston, Texas
EXCLUSIVE EXPORT REPRESENTATIVES: Hunt Export Company, 19 Rector Street, New York City, N. Y. • Avda Pte. R. Saenz, Pena 832, Buenos Aires, Argentina

Tanker Sale Report

The Maritime Commission sold 18 tankers in February, bringing total sales of oil carriers to 121, of which 61 went to foreign governments and operators. February sales included eleven vessels to be transferred to foreign registry.

The commission now is offering for sale 63 small vessels, including six tankers and a number of lighters and barges. The tankers offered, with bids to be opened April 9, include the Merry Queen,, 161 feet in length; the M. L. Sylvia, 180 feet, and the Gulfspray, 136 feet, located at Charleston, S. C.; the J. J. Kelly, 109 feet, located at San Diego, Calif., and the Y-29 and Y-30, both 162 feet, located at San Francisco.

SQUEAKS from the BULL WHEEL

Exploratory Completion

A professor who had just checked out of a hotel suddenly remembered that he'd left his umbrella. So he scurried back to the room he'd just vacated. When he got outside the door, he heard voices. The room had already been rented—apparently to newlyweds, for this is what he heard: "Whose iddow pink mouth is that?" "Yours," came the sweet reply. "Whose iddow turned up nose it that?" "Yours." "Whose iddow handsikins are those?" Same answer. The professor didn't wait to hear more. He rapped smartly on the door and shouted: "See here, my lad, when you come to an umbrella, that's mine!"

Life With Father

"This bed," said the antique dealer to an unbelieving prospect, "belonged to my great-great-grandmother."

"Yeah? One of the beds Washington slept in, no doubt."

"Very likely, sir . . . though, of course, you'd never get grandmother to admit that."

With Buckets

Preacher, concluding a sermon on temperance: "And I say that all the liquor in the nation should be thrown into the river!"

Choir leader: "The next selection by the choir will be 'Shall We Gather At the River'?"

Life Is Like This

"Have you got anything in black and white to show that Sambo promised to marry you?" the lawyer inquired of his dusky client.

"Nossuh. Jes' black."

This Curious World

A friend of ours spent so much money courting his girl that everyone now says he married her for his money.

Home is the place a man can say anything he pleases because nobody pays any attention to him.

Many a love nest is built on a foundation no stronger than a shapely limb.

Widow's lament: "I've had so much trouble getting my husband's affairs wound up that sometimes I wish he hadn't died!"

The war between the sexes will never be fought to a successful conclusion—mainly because there is so much fraternizing with the enemy.

And then there was the indignant girl who screamed out in the moonlight: "I'll give you just 15 minutes to get your hand off my knee!"

She's not his best girl—just necks best.

A recent headline in the paper reflects the clothing shortage: "Railroad President to Testify in Union Suit."

Poet's Nook

A little moonlight
Now and then,
Will marry off
The best of men.

Hints for Householders

"And what aré your grounds for divorce?"

"Joe snores, Your Honor."

"How long have you been married?"

"A week."

"Divorce granted; you shouldn't know whether he snores or not."

Minor Mishap

"Wait a minute, Beautiful. I thought I heard something break."

"Never mind; it was just my promise to mother."

Life's Little Problems

"Henry, you and I get along so well together, I think we should get married."

"Nothing doing. Where would I spend my evenings?"

Give Her Time

"Sorry, miss, but we can't issue you a marriage license unless your form is filled out properly."

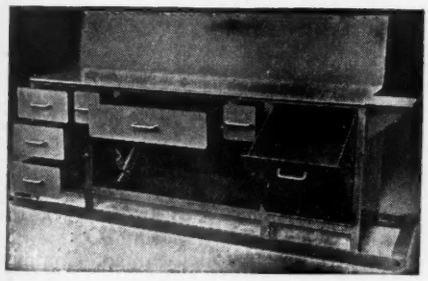
"Whadda you care, Butch, as long as my boy friend likes me?"

And No Detours

A British delegate to the UN spent some time in New England and was reported to have been shocked by what he called the "open display of sex mindedness in that part of the country." When asked what he meant, he said, "Well, as I drove along your highway, it confronted me again and again. First it was 'Soft Shoulders,' then 'Dangerous Curves,' 'Five Gals for $1,' 'Try Ethyl,' and finally 'Watch Out for Children.'"

OWEN

TYPE "A" WORK BENCHES



REDUCE DRILLING EXPENSES

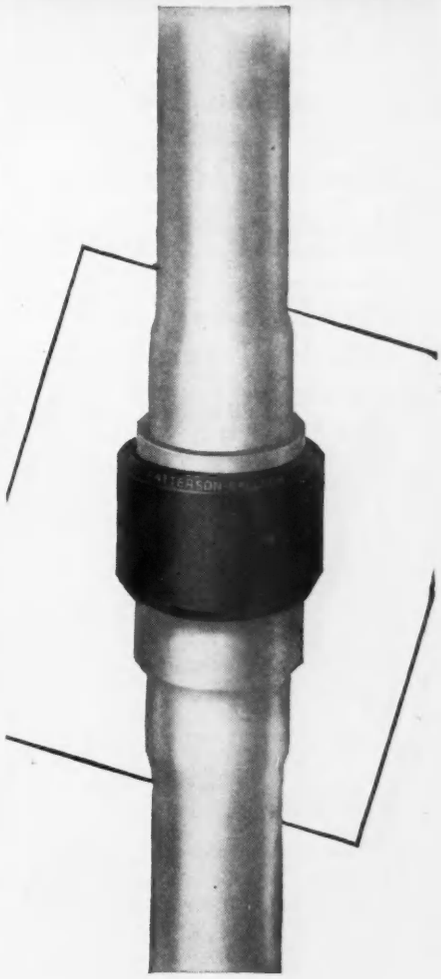
These all-steel, all-welded benches provide a convenient place for all hand tools on the rig. They save drilling dollars by reducing loss and damage of tools and by saving time ordinarily spent in looking for misplaced tools.

Six big drawers and a rag bin provide storage space for all the tools on your rig. Drawers are weatherproof and mounted on rollers for easy operation.

Owen Work Benches are sold through all supply stores. Order one for each rig you operate . . . they're available for immediate delivery.

OWEN TOOL COMPANY
ROUTE 9 BOX 800-B V-2 4341
HOUSTON, TEXAS

"Best Bet Yet"



SAVE YOUR TUBING!

Tubing collars worn by contact with casing steal the profit out of pumping. Patterson-Ballagh Plastic Tubing Protectors prevent both collar and casing wear. Oil-proof, wear-resistant, insulating. They are pressed onto the collar under pressure and will not come off. Made in all sizes. End your tubing troubles. CALL in your Patterson-Ballagh man.

Specify
PATTERSON-BALLAGH
A DIVISION OF BYRON JACKSON CO.
"Best Bet Yet"

PLASTIC
TUBING PROTECTORS

1900 E. 65th Street, Los Angeles 1
6247 Navigation Boulevard, Houston 11
808 Graybar Building, New York 17
931 Russ Bldg., San Francisco 4

MANAGEMENT and PRODUCTION men want

FACTS

about equipment they buy

Here are FACTS about

Coffing Hoists

"SAFETY-PULL"
Ratchet Lever Hoists

For all kinds of construction and maintenance work, wherever a lift or pull is needed, there is a "Safety - Pull" to meet your requirements. SAFE, DURABLE, DEPENDABLE. Capacities range from ¾ to 15 tons, yet they weigh only 14 to 150 pounds.

"QUIK-LIFT"
Electric Hoists

For dependable and economical service the "Quik - Lift" incorporates EFFICIENCY with SPEED, POWER and DURABILITY. Just plug it in and speed up production. Capacities from 500 to 4000 pounds with lifting speeds from 4 to 49 feet per minute.

MODEL Y-C
Spur Geared Chain Hoists

Coffing Spur Geared Chain Hoists embody the planetary gear system with the Weston automatic brake. There are seven capacities ranging from ½ to 5 tons. A sturdy, dependable hoist for heavy work and in the production line.

Contact Your Supplier or Write for
BULLETIN O C-100

Coffing Hoist Co.
Danville, Illinois U. S. A.

E. R. Millett, Jr., has been named secretary-treasurer of the California Natural Gasoline Association, succeeding **George L. Tyler,** secretary - treasurer for the past nine years, who has resigned. Millett is a veteran of World War II, having served with the Army in Japan and Korea. He was discharged with the rank of captain. For ten years prior to the war he was in business as a consulting petroleum engineer. This was preceded by three years' experience with Union Oil Company and one year with Martin Van Couvering.

E. R. Millett, Jr.

J. G. Wootten of Graham, **Ray J. Dilger** of Fort Worth, and **Fred M. Manning** of Denver have organized the Saguard Drilling Company to operate in Texas with a capital stock of $10,000.

W. B. Browder, Jr., and **Morris K. Womack** of Houston and **Douglass C. Fonda** of Stamford, Conn., have organized the Fonda Oil Company, Inc., to operate in Texas, with headquarters at Houston.

Harvey Lee, formerly chief scout for Union Oil Company, has been transferred to the company's land department. **Claude Leverett** of the Dominguez paleontology laboratory has been advanced to Lee's old post.

H. C. Rector has been appointed assistant drilling superintendent of Standard Oil Company of California's northern California district, succeeding **C. L. Ruse,** retired.

R. A. Baker, formerly general superintendent of laboratories for General Petroleum Corporation, has been made assistant manager. **H. A. Mason** has been made assistant to the manager of laboratories; **John Southard,** foreman of the Vernon, Calif., control laboratory; and **R. D. Fisher,** superintendent of laboratories at Torrance.

Elmer Price, Coastal Division drilling foreman for Shell Oil Company, has been transferred to Bakersfield. **Roy Robinson,** drilling foreman at Sacramento, also has been moved to Bakersfield. **Willis C. George,** Coastal Division driller, has been advanced to production foreman.

Cyrmes Pitman, engineer and gas sales consultant, has been transferred to the Jackson, Miss., office of United Gas Pipe Line Company, replacing **Burnie Porter,** who has been transferred to the general office in Shreveport. Porter has been in the Jackson district 12 years. Pittman has been with the company in Mississippi and Louisiana since 1930.

Earle F. Demond, California independent oil man, has been elected president of the California Stripper Well Association, succeeding **V. R. G. Wilbur. V. L. Norman,** general manager of Woolner Oil Corporation, Ltd.; **L. A. Donnelly,** vice president of Exeter Oil Company, Ltd.; and **Edwin P. Crail,** president of Victory Oil Company, were elected vice presidents; **Thomas H. Work,** of Nordon Corporation, Ltd., was reelected secretary-treasurer and **Richard Fenton,** executive vice president, also was re-elected.

James W. Kisling, Jr., has opened an office in the Palace Building, Tulsa, for the practice of petroleum geology. He will be associated with **W. C. Bednar.**

Y. Barbier of Toulouse, France, drilling engineer with Societe Nationale des Petroles d'Aquitaine, was in Houston last week inspecting new oil field equipment and observing drilling practices.

W. G. Skelly, head of Skelly Oil Company, Tulsa, was awarded the Green-T Club's "man of the year" award for 1946 at a recent Tulsa Chamber of Commerce meeting. He received the award for "contributions to the betterment of the city."

R. S. Sullins and **G. E. Cannon,** petroleum engineers for Humble Oil & Refining Company, will discuss "Control of Abnormal Pressures on the Gulf Coast" before the Delta Section, AIME, in Arnaud's Restaurant, New Orleans, on April 8.

Walter A. Haas, president of Levi Strauss & Company, San Francisco and an officer and director of various real estate and financial organizations in California, has been elected a member of the board of directors of Tide Water Associated Oil Company.

C. C. Hogg, former oil man and now director of the Edwy R. Brown School of Petroleum at Marietta, Ohio, College, has been appointed by **Thomas J. Herbert,** governor of Ohio, to serve on the Research and Coordinating Committee of the Interstate Oil Compact Commission.

H. W. Ladd, Stanolind Oil & Gas Company, Tulsa, discussed the selection of casing for oil wells before the Oklahoma Society of Petroleum Engineers in Oklahoma City. **Don Knowlton** of Knowlton Engineering Company spoke on "The Problems of Unitization."

Sol Brachman of Fort Worth has accepted the chairmanship of the National Oil and Petroleum Division in the nationwide $170 million campaign of the United Jewish Appeal for Refugees, Overseas Needs and Palestine. Brachman said plans are under way for appointment of local committees throughout the trade and for the coordination of petroleum drives with overall community campaigns.

M. I. Signer, head of the department of mining has been named dean of the faculty of the Colorado School of Mines. He succeeds **James Boyd,** nominated by **President Truman** for the position of director of the United States Bureau of Mines.

M. I. Signer

Signer has been head of the department of mining engineering since 1943, and since 1929 has been a member of the faculty of that department. He formerly was engineer for the state highway department of Illinois and engineer for the Original Mining and Milling Company of California.

»

W. R. Holway, Tulsa, consulting engineer, was elected to membership of the American Institute of Consulting Engineers, and is the first Oklahoman to receive such an honor.

»

Col. Louis Pineau, president of the Permanent Council of World Petroleum Congresses (London), has been named an advisor on foreign business to Houdry Process Corporation. Pineau recently visited the Houdry Laboratories in the U. S., where his acquaintance with **Eugene J. Houdry** and associates was renewed. Pineau sailed for Paris recently with Houdry.

»

B. M. Kaiser has been named Southwest District manager of motor trucks for International Harvester Company. Kaiser has been retail salesman, retail manager, assistant branch manager at Cincinnati and Baltimore, branch manager at West Haven, and branch manager at Baltimore. **J. T. Sullivan** formerly district manager, Southwest District, has been transferred to the Eastern District in the same capacity.

»

C. V. Guinn, district service manager at Oklahoma City for Mid-Continent Supply Company, has been named general service manager for the whole organization and will operate from the company's general offices in Fort Worth.

»

Charles M. Reading has been named assistant manager of the engineering department and Turner Smith, chief structural engineer, for General Petroleum Corporation.

»

Alfred J. Yardley has been elected president of Jenkins Bros., manufacturers of valves, succeeding his father, **Farnham Yardley,** who becomes chairman of the board, after serving as president for 30 years. Alfred Yardley joined the firm in 1932 at the plant in Bridgeport, Conn. A great-grandson of **Nathaniel Jenkins,** the founder, he is the fourth president of Jenkins Bros. in the 83 years of the company's existence.

J. A. Bynum, who has been district sales manager for Reading-Pratt & Cady Division of American Chain & Cable Company, Inc., in the Southwest for many years, has been appointed special representative on Reading-Pratt & Cady valves for the petroleum industry in that area. **J. J. Reed** has been appointed district sales manager to succeed Bynum. For most of the past five years Reed has been located at the factory in Reading, Penn. Both Bynum and Reed will make their headquarters at the Houston office, 630 McFarland Street.

Robert A. Neal, vice president of Westinghouse Electric Corporation, has been named general manager of the company's Pacific Coast operations.

»

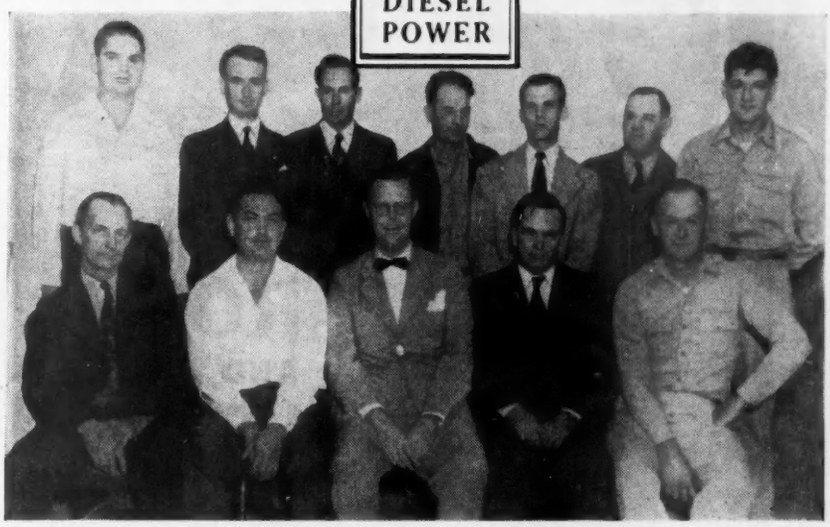
Edwin P. Corey has resigned as general manager of tubular sales for The Youngstown Sheet and Tube Company. He had held this position with Youngstown since October, 1923. Prior to this, he held various positions with the National Tube Company, a firm he joined in February, 1895.

ENGINES DESIGNED TO MEET THE NEEDS of the Oil Field and Geophysical Operator

GM GENERAL MOTORS DIESEL POWER

SINGLE ENGINE UNITS Up to 200 HP

MULTIPLE ENGINE UNITS Up to 800 HP



Left to right, front row: R. J. Naquin, supervisor, parts and service; Thomas Martin, service department; George S. Frierson, Jr., President; H. L. Ford, assistant general manager; B. E. McMichael, service manager. Rear row: Ed Henderson, service department; F. J. Richardson, sales department; C. F. Wells, shop foreman; Kenne Shoemaker, welding; C. V. Culpepper, service department; L. W. Meherin, salesman; William Balkon, service department.

AN ORGANIZATION TO SERVE YOU!

Our distribution of General Motors Diesels extends far beyond mere sales of new engines. In our new plant, we have full shop facilities and complete parts stocks for any repair or overhauling job. We supervise installations and, will train your engine operators and maintenance men. Our entire trained organization is at your call.

GEORGE ENGINE CO.

MAIN PLANT
1111 Jefferson Highway
NEW ORLEANS, 18, LA.

LAKE CHARLES BRANCH
512
Railroad Ave.

H. F. COLBY
Manager

MEN IN THE INDUSTRY NEWS

Arden R. Hacker has been named manager of mechanical goods design at Goodyear Tire & Rubber Company's plant in Hurlingham, Argentina. A native of Sandusky, Ohio, Hacker joined Goodyear in 1935 after receiving an engineering degree from Ohio State University. He started in Akron on the company's production training squadron and then worked three years for Goodyear Tire & Rubber Company, including an assignment in Colombia and Venezuela.

Cecil E. Edwards, graduate of the Journalism School at Southern Methodist University, has been appointed field representative in the Public Relations department of U. S. Steel Corporation Subsidiaries, Southwest Division, Dallas. The district includes Texas, Oklahoma and New Mexico.

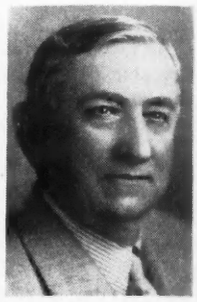
»

Perry L. Francis has become head of the sales department for Alan Wood Steel Company, Conshohocken, Penn., succeeding the late **Willard S. Haring.**

C. E. Ridley, former chief clerk in the Lindsay, Okla., store of Bethlehem Supply Company, has been promoted to field representative in the Lindsay area. **J. J. C. LeFlore,** former floorman at Seminole and more recently at Lindsay, has been advanced to assistant store manager at Lindsay.

Deaths

C. M. (Dad) Joiner, 87, discoverer of the East Texas field, died March 27 in Dallas. Born in Lauderdale County, Alabama, Joiner went to Texas when he was 17 and engaged in farming and the cattle business. He returned to Alabama and then moved to Oklahoma, where he opened the Cement field. Following financial reverses and loss of health in 1922, he went to California for a year, then returned to Texas and took up a block of leases in Rusk County. After abandoning two wells due to mechanical troubles, his Daisy Bradford 3 was completed in the Woodbine on October 3, 1930, flowing 400 barrels of 38-gravity oil from 3592 feet. Joiner realized comparatively little cash for himself and stockholders from the discovery but he did make an acreage sale involving $1 million in oil payments.



C. M. (Dad) Joiner

»

Gilma Smith, 42, Tulsa oil field worker and World War II veteran, died in Tulsa March 24.

»

Dr. Roy Cross, 63, chemist, died in Kansas City, Mo., March 21 of a cerebral hemorrhage. He was well known for his work in developing a petroleum cracking process. He was president of the Kansas City Testing Laboratories.

»

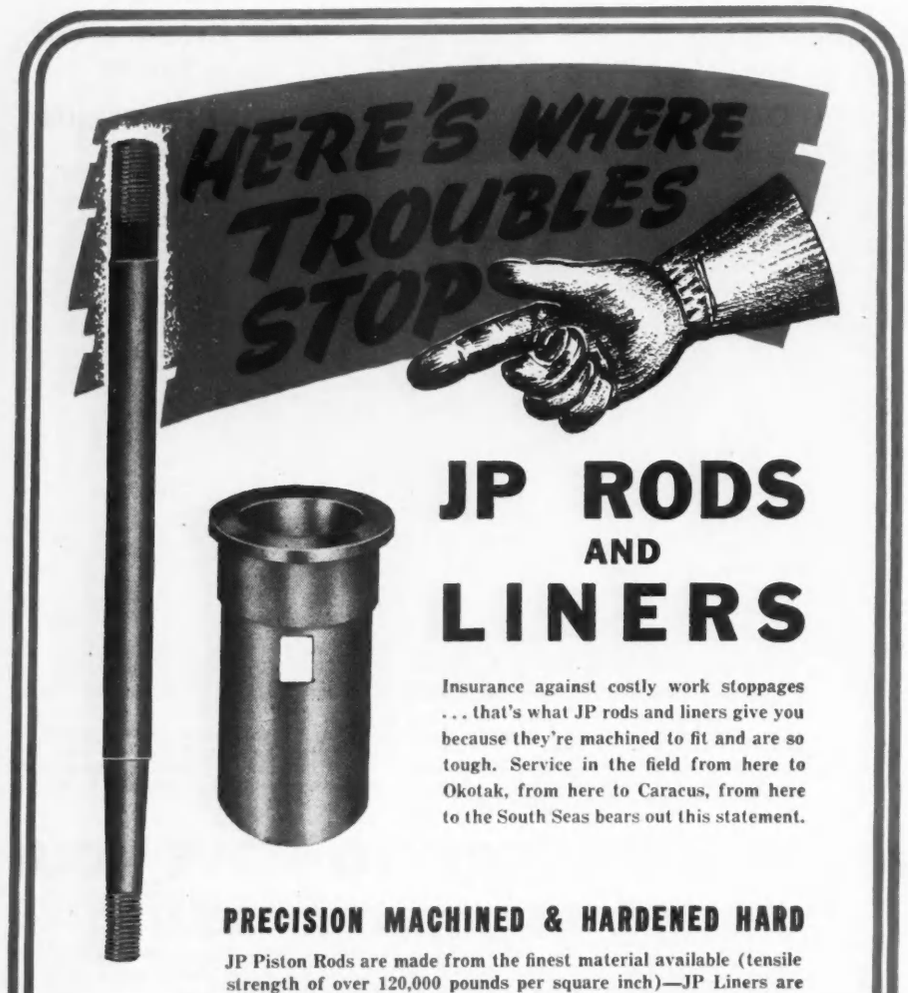
Victor C. Mieher, 63, attorney for Amerada Petroleum Corporation, died in Tulsa March 27. He had been head of the oil firm's legal department since shortly after its organization in Tulsa. He was a native of Illinois.

»

J. H. Grundish, 72, Tulsa, retired drilling contractor and oil producer, died March 28. He discovered an oil pool in McIntosh County in 1914, and the Grundish sand was named for him. He had lived in Tulsa for 35 years and in 1917 was general superintendent of Prairie Oil & Gas Company.

»

Leo H. Towers, Tulsa, president of the Diesel Power Company of Oklahoma City, died March 29 of injuries received in an automobile accident March 21. He was a native Tulsan.


HERE'S WHERE TROUBLES STOP
JP RODS AND LINERS
Insurance against costly work stoppages . . . that's what JP rods and liners give you because they're machined to fit and are so tough. Service in the field from here to Okotak, from here to Caracus, from here to the South Seas bears out this statement.
PRECISION MACHINED & HARDENED HARD
JP Piston Rods are made from the finest material available (tensile strength of over 120,000 pounds per square inch)—JP Liners are made from high grade steel forgings. By a special process, each rod and liner is hardened and individually inspected to pass 600 (or better) Brinell test.
Made to A.P.I. standards, JP Rods and Liners are available in all stock sizes (and special sizes) to fit any slush pump. Start NOW using JP (abrasion resisting) Rods and Liners.
JP
CALL—WRITE—WIRE—CABLE
for information on sizes and prices . . . Ask for our New Catalog . . . give us your specifications.
J P Machine & Tool Company
1534 S. E. 29
P. O. Box 4511
Tel. 3-8700
Oklahoma City

World Oil Economy

World economics of the oil industry have been clearly and interestingly presented by Dr. P. H. Frankel in his book, "Essentials of Petroleum." Non-technical in its treatment, this book is intended as a key to world oil economy, what's what about the industry, and how it works. It is an analytical appraisal of controlling economic factors in an impartial manner and gives the reader an insight into the structure of the business. The author deals with the theoretical, historical and political aspects of oil, and discusses the competitive as well as the monopolistic character of the industry on an impartial basis.

Printed in 173 pages, the publication contains five parts: Part 1, Oil and Public Opinion; Part 2, Economics of a Liquid; Part 3, Price Structure; Part 4, The Shape of the Industry; and Part 5, Policies for the Industry. The ideas of Sir Henri Deterding, founder of the Royal Dutch-Shell group, are briefly presented in contrast to the great plan of John D. Rockefeller. The book contains many annotations and an extensive bibliography.

Chapman & Hall, Ltd., 37 Essex St., London W.C.2. Price $3.

Petroleum Production

Volume 2 of the Petroleum Production series by Park J. Jones, consulting petroleum engineer, Houston, is off the press. The second in a series of five, the volume is entitled, "The Optimum Rate of Production." It contains 293 pages and includes a subject index, a natural logarithmic table and an exponential function table.

The 12 chapters touch on the variable factors governing production from oil and gas reservoirs. Chapter 1, "The Maximum Efficient Rate of Production," considers some basic theories on the distribution of hydrocarbons in the reservoir, and discusses some factors entering into the determination of efficient production rates for various type reservoirs. Calculations for the determination of recoverable fluids from the different types of reservoirs are presented in Chapter 2, "Oil, Condensate and Natural Gas Reserves." Pertinent information is contained in Chapter 3, "Well Producing Capacity for Reserves"; Chapter 4, "Interest Factors"; Chapter 5, "The Period of Development"; Chapter 6, "Uniform Rates of Production"; Chapter 7, "Uniform Rates of Depletion"; Chapter 8, "Economic Limits for Wells and Reservoirs"; Chapter 9, "Increasing Rates of Depletion"; Chapter 10, "Decreasing Rates of Depletion"; Chapter 11, "The Optima for Uniform Rates of Depletion"; and Chapter 12, "The Optima for Variable Rates of Depletion."

Jones' second book on production contains numerous formulas and charts which are intended to aid the engineer in his production problems for practically every type of reservoir. All factors used are clearly defined and values may be substituted from field data.

The Gulf Publishing Company, P. O. Box 2608, Houston 1. Price: $4.50.

Technological Index

A comprehensive index guide to the tens of thousands of reports on wartime technological developments has been prepared by the Office of Technical Services, Department of Commerce. The Index to the Bibliography of Scientific and Industrial Reports contains about 45,000 cross reference entries classified under major subject headings. Each entry lists the file number of the report and refers to the page number of the bibliography on which an abstract of the report appears. With the index and a file of the bibliography at hand, a researcher may readily determine the number of reports available from OTS in a special field and examine the abstracts. The first volume of the index covers the first 25 issues of the bibliography from January 11 through June 28, 1946. Future volumes of the index will cover quarterly periods. The index may be purchased from the Superintendent of Documents, Washington 25, D. C., at 50 cents per copy.

Oil, Gas Review

The Rinehart Oil News Company, Tulsa, has issued a Year Book which presents a review of oil and natural gas developments and exploration during 1946 in 22 states.

The book contains more than 300 pages, affording easy reference for discovery data on wells that opened new fields during the year. The Year Book also contains details on operations that resulted in extensions to establish reservoirs and on wells that yielded new producing zones in old pools.

A history is given of all discoveries in 1946 in each area, and trends of future activity are outlined. Maps of important new fields are included.

Secondary Recovery

"Secondary Recovery of Petroleum in Arkansas . . . A Survey," a 250-page report on the prospects for secondary recovery in the Arkansas oil fields, will be ready for distribution in the near future, according to The Interstate Oil Compact Commission's publication, *Compact Comments*. The survey, made under the direction of Dr. George H. Fancher, professor of petroleum engineering, The University of Texas, was authorized by Act 302 of the 1943 Arkansas General Assembly.

All pertinent data for each of the oil fields of Arkansas have been collected, studied and reported in tables, graphs, maps and prose. Each reservoir, except the few one- and two-well fields, has been mapped. Structural and isopachous maps have been prepared. A thorough digest of the geology of the oil-producing region has also been made. Finally, all available data for each oil-bearing reservoir in the state have been studied and a prediction made regarding the possibility of applying secondary recovery methods successfully. The report contains 132 figures and 114 tables of data published by the Arkansas Oil and Gas Commission, and is to be sold at a price which will only partly defray cost of publication.

PORTABLE Gravity Meter

Accurate to .01 of a milligal—compact and light, can be carried by one man on back-pack or mounted in rear seat of sedan or jeep and readings made without removing from car. Write for complete details and sale or lease plan.

NORTH AMERICAN GEOPHYSICAL CO.
2627 Westheimer - Keystone 3-7408
HOUSTON 6, TEXAS

1947 Printing

POSSIBLE FUTURE OIL PROVINCES of the UNITED STATES AND CANADA

A symposium conducted by the Research Committee of The American Association of Petroleum Geologists, A. I. Levorsen, chairman. Papers read at the Twenty-sixth Annual Meeting of the Association, at Houston, Texas, April 1, 1941, and reprinted from the Association **Bulletin**, August, 1941.

Edited by
A. I. LEVORSEN

154 pages, 83 illus.
Price, $1.50, Postpaid

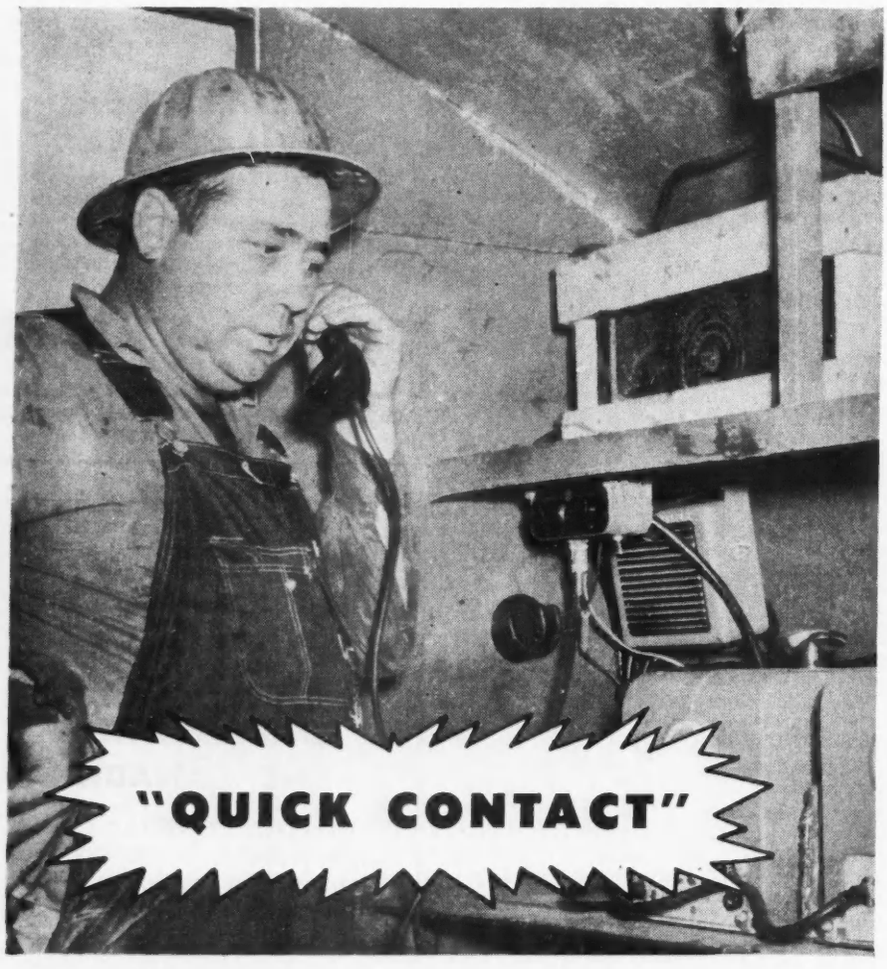
AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
Box 979, Tulsa 1, Oklahoma

International Harvester Makes Branch Management Changes

International Harvester Company has announced the following changes in branch management:

W. F. Schaeffer, formerly retail motor truck manager at Shreveport, La., has been appointed assistant manager at that branch; M. R. McClure, formerly sales promotion man at Fort Dodge, Iowa, has been appointed assistant manager at that branch; H. T. Rosell, formerly retail motor truck manager at Wichita, Kans., has been appointed assistant manager at the Dallas motor truck branch.

R. G. Walls, formerly retail motor truck manager at Atlanta, Ga., has been appointed assistant manager at the New Orleans motor truck branch; G. B. Healey, formerly retail manager at Eau Claire, Wis., has been appointed assistant manager at the Davenport motor truck branch; J. D. Richardson, formerly assistant manager at Omaha, Nebr., has been appointed manager of the new Omaha motor truck branch.



Radio communication is the modern way to speed drilling operations . . . Republic's Oil Department offers the efficient way to handle financial preliminaries. Staffed by men skilled in finance and experienced in oil, Republic National Bank's Oil Department provides sympathetic knowledge and understanding of your problems and requirements. Take advantage of this combination . . . designed for service to you.

REPUBLIC
NATIONAL BANK of DALLAS
Capital and Surplus $20,000,000 . . . Largest in the South

Wire Fabrics Division Official Named in Roebling's Expansion

J. F. Berger has been named assistant sales manager, Woven Wire Fabrics Division. Berger has been with the John A. Roebling's Sons Company 37 years.

His appointment is coincident with a program of expansion in both machinery and products for the Woven Wire Fabrics Division. This expansion is part of Roebling's $6 million investment in modernization and enlargement of production facilities.

J. F. Berger

Goodrich Plans $1 Million Expansion At Oklahoma Manufacturing Plant

Expansion of tire manufacturing facilities at its Miami, Okla., plant involving an expenditure in excess of $1 million was announced by T. G. Graham, vice president of the B. F. Goodrich Company.

Graham said the increased facilities would boost production approximately 16 percent over the current output and would provide employment for about 150 to 200 additional workers.

The new expenditures, making total cost of the plant more than $8 million, are earmarked for new equipment which will be installed by July 1, Graham said. Completed in 1944, the Miami plant now employs more than 1000 persons.

Westinghouse to Expand Buffalo Plant Manufacturing Facilities

Plans to expand manufacturing facilities at the Westinghouse Electric Corporation's Buffalo, N. Y., plant have been disclosed by T. I. Phillips, vice president.

The new operation, formerly a part of the Switchgear and Control Division at East Pittsburgh, will be known as the "Industrial Control Division." To facilitate the transfer, L. R. Ludwig, manager of the Motor Division, has been assigned responsibility for this operation in its present location. Operations at Buffalo will eventually include motor, industrial control, copper wire and welding activities, and will be known as the Buffalo Divisions, rather than the Buffalo Motor Division. Ludwig will be manager of the Buffalo Divisions.

An additional 1500 persons will be added to the pay rolls at Buffalo when operations are fully under way, bringing employment to 7200 persons, with an annual pay roll of $14½ million.

Rollway Moves Office

Change of address of the Chicago office of Rollway Bearing Company, Inc., has just been announced. Room 3716, Civic Opera Building, 20 No. Wacker Drive, Chicago, has been occupied by F. S. Darke and W. C. Schloskey, Rollway representatives in Chicago.

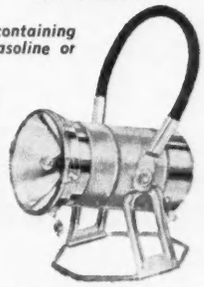
ECOLITE-92BM

With Locking Device and Seals

TWICE APPROVED for DOUBLE SAFETY

Approved by U. S. Bureau of Mines & Underwriters' Laboratories

—for use in atmospheres containing Methane or natural gas, gasoline or petroleum vapors.



This double-safety lantern has a tamper-proof reflector and cover with locking device and seals. Throws 1500 foot beam. Instantly ejects broken bulbs from battery circuit. Large handle. 360° pivoting feature gives direct illumination where needed and leaves both hands free for work.

Now at Supply Stores

ECONOMY ELECTRIC LANTERN CO.

3100 W. Cherry St. Milwaukee 8, Wis.

FILTRATION

Systems and Service

Efficient, economical filtration systems for salt water disposal or feed water purification. Standard filtration methods are intelligently applied to assure proper coagulation and crystal clear effluent.

Fast Deliveries • • Dependable Service

GULF ENGINEERING CO., INC.

"Service, Not Promises"

1682 INGEBORG ST. HOUSTON, TEXAS

916 S. PETERS STREET NEW ORLEANS, LA.

DROP FORGED, HEAT TREATED STEEL

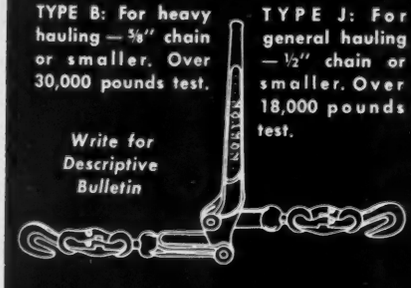
LOAD BINDERS

FOR OIL FIELD HAULING

TYPE B: For heavy hauling — 3/8" chain or smaller. Over 30,000 pounds test.

TYPE J: For general hauling — 1/2" chain or smaller. Over 18,000 pounds test.

Write for Descriptive Bulletin



NORTON

EQUIPMENT CO., INC.

P. O. BOX 1185 HOUSTON 1, TEXAS

George W. Stevens

Walter N. Westland

Eastern, Mid-Continent Regional Managers Appointed by Cummins

Walter N. Westland has been named regional manager of the Eastern area and George W. Stevens of the Mid-Continent region for Cummins Engine Company, Inc., Columbus, Ind.

Westland, who has been general sales manager of Marion Power Shovel Company for three years, will have headquarters in the Chrysler Building, New York, and his territory includes New York, New Jersey, Pennsylvania and the five New England states.

Stevens formerly was district manager of The National Supply Company, Superior Engine Division, in charge of oil field equipment sales in the Mid-Continent area. His headquarters will be in the Fair Building, Fort Worth, and his territory includes Texas, Oklahoma and Louisiana.

Carmen Tenuta has been named regional service representative in the Eastern region.

A. C. Harding

Harry T. Thorson,

New Black Hills Bentonite Firm Builds Plant at Moorcroft, Wyo.

Black Hills Bentonite, Inc., is constructing a bentonite plant at Moorcroft, Wyo., and expects to be in operation by June 1. The firm will manufacture bentonite for oil well drilling, foundry and other uses.

President of the firm is Harry T. Thorson, formerly with Illinois Pipe Line Company and Midwest Refining Company. Since 1941 he has been an independent producer and contractor. He is also general manager for Osage Trust and a member of the board of directors of the Rocky Mountain Oil & Gas Association.

A. C. Harding, general manager of the company, joined Baroid Sales Division, National Lead Company, in 1938, and through the war years was superintendent at that company's plant in Clay Spur, Wyo. In 1945 he went to the Los Angeles office as general superintendent. He resigned early this year to assist in forming the new company at Moorcroft.

By CLIPPER

for your trip . . . or what you ship

it's HOURS instead of days

When You Travel . . . fly by swift, comfortable Clipper! Service now to Mexico, West Indies, Central and South America, Europe, Africa, Alaska, Hawaii, Australia, New Zealand, the Near East and the Orient. Please see your local Travel Agent or Pan American for rates and reservations.

When You Ship . . . speed orders to customers by Clipper Express. Call Railway Express Agency, Inc., for details. Pickup and delivery in all principal cities and towns in U.S.

PAN AMERICAN WORLD AIRWAYS

The System of the Flying Clippers

Standco
NO-SMOKE

STANDCO BRAKE LINING

For the easiest brake known. It feeds off evenly. Standco never scores brake rims. See pages 3608-3613, Composite Catalog.

Standco Brake Lining Co.
HOUSTON

William M. Barret, Inc.
Consulting Geophysicists

Specializing In Magnetic Surveys

Contracts accepted for domestic and foreign projects, using the most improved instrumental and interpretative technique.

GIDDENS-LANE BUILDING
SHREVEPORT, LOUISIANA

W. P. JENNY
Consulting Geologist and Geophysicist
MICROMAGNETIC SURVEYS
AERIAL MAGNETIC INTERPRETATIONS
GEOPHYSICAL CORRELATIONS
Charter 4-4777 — 1404 Esperson Bldg.
Lehigh 0940 — HOUSTON, TEXAS

HOUSTON LABORATORIES
Analytical and Consulting Chemist
Podbielniak Gas Analysis
Oil Field Brines, Waters and Cores complete Evaluation of Crude Oils
Long Distance 267 Box 132, Houston, Tex.

THE FORT WORTH LABORATORIES
Analysis of oil field brines, cores, gas, oil and minerals. Field gas testing. R. H. Fash, Vice President; Long Distance 138. 823½ Monroe Street, Fort Worth, Texas

MAGNETOMETER CONTRACTOR
Oil and Mining Exploration.
Standard Instruments and Interpretive Methods.
VIC KARNES
Weiss Building Annex, Beaumont, Texas
Office Phone 2701 — Home Phone 6915

LOAD BINDERS
Drop-Forged • Malleable Iron • Steel

Drop-Forged • Heat Treated • 2 Sizes
Durbin-Boomer F-1—2 swivels, ⅜, ⅞ or ½" chain
Durbin-Boomer F-2—2 swivels, ⅞, ½ or ⅝" chain
Malleable Iron • Heat Treated • 5 Sizes
MIDGET No. 1—1 swivel, ¼" chain
DELTA No. 1—1 swivel, ⅝ or ⅜" chain
DIXIE No. 1—2 swivels, ⅞ or ½" chain
LONE STAR 1—2 swivels, ⅞, ½ or ⅝" chain
LONE STAR 2—2 swivels, ⅞, ½ or ⅝" chain
Write for Catalog
DURBIN-DURCO
6611 Olive Street Road • St. Louis 5, Mo.

New Export Corporation Named Representative for Cummins

The Cummins Engine Company of Columbus, Ind., announced the appointment as export representative the newly formed Mid-Continent Cummins Export Corporation. This organization is operated by men with long experience in the sales and service of Cummins Diesel Engines.

Export offices are at 42 Broadway, New York City; 6220 Navigation Boulevard, Houston; Mid-Continent Building, Fort Worth; Milam Building, San Antonio; 811 Howard Street, New Orleans, and the Petroleum Building, Los Angeles.

Development Manager Appointed for Goodyear's Lincoln, Nebr., Plant

Appointment of A. M. Finley as development manager of Goodyear Tire & Rubber Company's mechanical goods plant in Lincoln, Nebr., was announced by W. S. Wolfe, factory manager of domestic operations.

Finley's new post fills a need resulting from current expansion of the Goodyear factory in Lincoln, Wolfe said. Expanded facilities will triple production within a year, and more than $100,000 worth of laboratory equipment is being installed for testing materials and products. The laboratory will function under Finley's supervision.

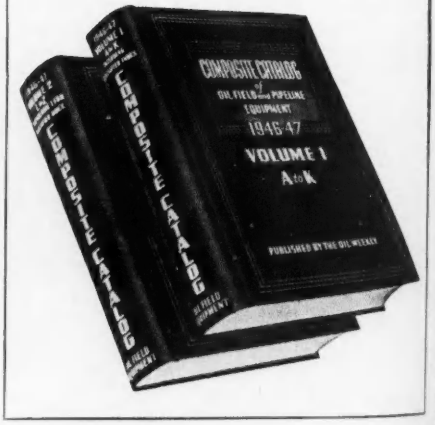
Advertisers' Index

EDITORIAL INDEX, PAGE 25

*Acme Fishing Tool Co. ---- 89
American Association of Petroleum Geologists ---- 97
*American Cable Division American Chain & Cable Co. ---- II Cover
American Steel & Wire Co. ---- 23
Avondale Marine Ways, Inc. ---- 91
*Baker Oil Tools, Inc. ---- 66
Wm. M. Barret, Inc. ---- 100
*Big Four Machine & Supply Co. ---- 80
*Black, Sivalls & Bryson, Inc. ---- 18
Briggs & Stratton Corp. ---- 85
*Broderick & Bascom Rope Co. ---- I Cover
*Cameron Iron Works, Inc. ---- 56 and 88
*Caterpillar Tractor Co. ---- 55
*Chrysler Corp. ---- 67
Dan L. Clark Drilling Co. ---- 91
*Coffing Hoist Co. ---- 94
Columbia Steel Co. ---- 23
Continental Hotel ---- 86
The Continental Supply Co. ---- III Cover
*Fred E. Cooper ---- 73
*Crane Co. ---- 47
Dowell Incorporated ---- 28
*Dresser Industries, Inc. ---- 51
*Durbin-Durco ---- 100
The Eagle-Picher Co. ---- 83
*Economy Electric Lantern Co. ---- 99
*Emerol Manufacturing Co. ---- 86
*Emsco Derrick & Equipment Co. ---- Insert Opp. 18
*Fairbanks, Morse & Co. ---- 59
Ft. Worth Laboratories ---- 100
George Engine Co. ---- 95
*H. P. Gott Manufacturing Co. ---- 82
*Gray Tool Co. ---- Insert Opp. 19
*The Guiberson Corp. ---- 2-3
Gulf Engineering Co. ---- 99
*The Gulf Publishing Co. ---- 74
Homelite Corp. ---- 76
Houston Laboratories ---- 100
*Houston Slush Pump Co. ---- 13
*Hughes Tool Co. ---- IV Cover
Humble Oil & Refining Co. ---- 12
*Industrial Engine Division Chrysler Corp. ---- 67
*International Harvester Co. ---- 48
J. P. Machine & Tool Co. ---- 96
W. P. Jenny ---- 100
*Jensen Brothers Manufacturing Co. ---- 78
*Johns-Manville Corp. ---- 87
Jones & Laughlin Steel Corp. ---- 26
Jones & Laughlin Supply Co. ---- 7
Vic Karnes ---- 100
Landis Machine Co. ---- 17
*Le Roi Co. ---- 81
*Link-Belt Co. ---- 1
*McCullough Tool Co. ---- 16
*Lee C. Moore & Co. ---- 5
Mechanical Manufacturing Co. ---- 22
*The National Supply Co. ---- 8-9
*Norma-Hoffmann Bearings Corp. ---- 14
*North American Geophysical Co. ---- 97
*Norton Equipment Co. ---- 99
*Oil Well Supply Co. ---- 65
*D. W. Onan & Sons, Inc. ---- 84
*Orbit Valve Co. ---- 63
*Owen Tool Co. ---- 93
*Pacific Pumps, Inc. ---- 51
Pan American Airways, Inc. ---- 99
*Patterson-Ballagh Division Byron Jackson Co. ---- 24 and 93
Pelican Well Tool & Supply Co. ---- 84
*Penberthy Injector Co. ---- 64
Hotel Pittsburgher ---- 74
*J. P. Ratigan, Inc. ---- 60
*Regan Forge & Engineering Co. ---- 92
Republic National Bank of Dallas ---- 98
*Republic Supply Co. ---- 11
*SKF Industries, Inc. ---- 52
Sandlin Bros. ---- 76
Standard Oil Company of California ---- 6
*Standco Brake Lining Co. ---- 100
*Templeton, Kenly & Co. ---- 66
*Thornhill-Craver Co. ---- 68
The Torrington Co. ---- 20
Trading Post Section ---- 90
*Tuboscope ---- 21
United States Steel Corp. ---- 23 and 65
United States Steel Export Co. ---- 23
*Victaulic Company of America ---- 4
*W-K-M Company, Inc. ---- 15
War Assets Administration ---- 10
*Waukesha Motor Co. ---- 19
*Well Equipment Mfg. Corp. ---- 77
*The Wheland Co. ---- 79
The Winter-Weiss Co. ---- 74
The Youngstown Sheet & Tube Co. ---- 30

International Section

(Insert 68-69)

*Baker Oil Tools, Inc. ---- 22-23
*Baroid Sales Division National Lead Co. ---- 5
*S. R. Bowen Co. ---- 41
*The Brewster Co. ---- 10
*Gaso Pump & Burner Manufacturing Co. ---- 14
*Houston Slush Pump Co. ---- 18-19
*Hydril Co. ---- 6
*Lane-Wells Company ---- 13
*Larkin Packer Co. ---- 37
Lone Star Cement Corp. ---- 34
*Jas. P. Marsh Corp. ---- 26
*Martin-Decker Corp. ---- 33
*Mission Manufacturing Co. ---- 29
Murphy Diesel Co. ---- 17
*National Lead Co. ---- 5
*W. C. Norris Manufacturer, Inc. ---- 38
*Rector Well Equipment Co. ---- 42
*Reed Roller Bit Co. ---- 30-31
Seismograph Service Corp. ---- 9
*Technical Oil Tool Corp. ---- 25
*Wilson Manufacturing Co. ---- 2

*** The asterisk indicates that detailed information on products and services of the firm will be found in current 15th (1946-47) edition of the Composite Catalog of Oil Field and Pipe Line Equipment.**